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Mechanical and Electrical Meetings Draw Almost 3,800 Attendance

CHICAGO, once again was host to the 2,624 railroad men and guests and 1,163 supply men that attended the meetings and exhibit in connection with the coordinated mechanical and electrical meetings of the Air Brake, Car Department Officers', Locomotive Maintenance Officers', Master Boiler Makers' and Railway Fuel and Traveling Engineers' Associations as well as the Electrical Sections of the Association of American Railroads. These annual meetings were held September 15 to 17 inclusive, and all of the sessions were held at the Hotel Sherman except those of the Air Brake Association which this year met at the Hotel Morrison. This year's exhibit of electrical equipment was held at the Hotel Sherman under the auspices of the Railway Electric Supply Manufacturers' Association.

On the second day of the meeting John P. Kiley, president of the Milwaukee, was the principal speaker at the Presidents' Luncheon at the Hotel Sherman. Mr. Kiley, with an audience entirely of mechanical men, dealt specifically with their problems. He voiced some concern about the training of diesel operating and maintenance forces for the future. With our technological improvement, he said, more highly trained men are needed in all departments, and such men are hard to find. Mr. Kiley then mentioned many instances, such as steam hose, couplers, window glass for locomotives, pipe fittings, battery boxes and filters where the progress of standardization has not gone far enough to avert expensive delays because parts do not fit.

Hot boxes, said Mr. Kiley, continue a most pressing problem and it is important to find the cause. On one road at least, the higher speeds incident to diesel operation were suggested as the cause of a lot of hot boxes, but another road reported, "We don't operate a single diesel locomotive but we've got more hot boxes today than we've had in years."

Mr. Patterson's Remarks

The first morning's session of the Locomotive Maintenance Officers' Association was addressed by W. J. Patterson, member of the Interstate Commerce Commission. He reviewed the progress made over 35 years in the enforcement of regulations intended to improve the safety of railroad operation. In 1907, 4,534 railway employees lost their lives, according to Mr. Patterson, whereas in 1950 the fatalities were only 390, an all time low. Injuries to employees likewise have been materially reduced. Mr. Patterson attributed a large part of the improvement in conditions with respect to accidents to cooperation between railroad management and their employees in the observance of Federal requirements for equipment on locomotives and cars which has been demonstrated by the statistics of so called "train service accidents." One of the specific matters of cooperation which Mr. Patterson referred to was the fact 35 years ago there were many types and kinds of couplers that would couple automatically and could be uncoupled without the necessity of men going between cars but they were of different designs making their operation and maintenance difficult, if not impossible. At present there is only one standard freight car coupler known as the Type E and a defective or inoperative one is a curiosity, said Mr. Patterson. Mr. Patterson, in speaking on matters relating to safety pointed out that questions are frequently asked as to the improvement in the efficiency of railroad operations. "At the Commission," he said, "we have available from month to month a series of important indicators of operating efficiency. Gross ton-miles per train hour is frequently referred to as the best single overall measure of railway freight transportation efficiency since it combines the speed factor with the total weight of the train behind the locomotive and tender and reflects the average performance for each hour of train operation. In 1951 the gross ton miles per train hour were 89.2 per cent greater than in 1929. The advent of the diesel-electric locomotive particularly the increase in its use in freight service, in recent years has done much to improve operating efficiency as reflected by the increase in gross ton miles per train hour. In 1946 only 9.7 per cent of the freight gross ton-miles were handled by diesels as compared with 52.7 per cent in 1951. For the first five months of 1952 this percentage has risen to 62.7. In other words, almost two-thirds of the nation's railroad freight traffic is now handlel by diesel locomotives. The latest figures indicate that diesels handle about 70 per cent of the passenger train traffic, and 75 per cent of the yard switching service."

Speaking of air brakes, Mr. Patterson outlined the progressive advancement in the matter of power brakes and reviewed the fact that the Commission in 1922 entered upon an investigation to determine whether, and to what extent, power brakes and appliances for operating power brake systems then in general use were adequate and in accordance with the requirement of safety, what improved appliances or devices were available for use and what improvements in power brakes and appliances could or should be made to increase safety in train operation. He pointed out that "after comprehensive tests the Association of American Railroads adopted, effective September 1, 1933, revised specifications for freight-car power brakes making the AB type standard for new cars. Their interchange rules were also revised in November 1934, to require that all cars offered in interchange after January 1, 1945, be equipped with the improved brake. Failure of car owners to make adequate schedules for the conversion from the former brake equipment to the AB type on existing cars led to the issuance of an order by the Commission on September 21, 1945, requiring carriers to equip their cars used in freight service, except those equipped with passenger car brakes, with the improved power brake. The time limit within which this was to be done has been extended from time to time and now expires December 31, 1952. Consideration is now being given with respect to whether there should be a further extension of time within which to equip certain non-interchange cars."

Davidson Talks to Three Groups

Edward H. Davidson, director of the Bureau of Locomotive Inspection, Interstate Commerce Commission, spoke, on the second day of the meetings before the Boiler Makers' Association and, on the last day to the Locomotive Officers' and the Fuel and Traveling Engineers' groups.

To the Boiler Makers, Mr. Davidson made mention of the progress in the 41 years that is a matter of record, the reduction in boiler accidents being in the order of 856 boiler accidents to 35 boiler accidents and the reduction in fatalities from 91 to 2. Injuries dropped from 1,035 to 36 over the same period. "Because of technical developments," said Mr. Davidson, "we are witnessing what future generations may refer to as a revolution in motive power. This economic change may be compared to that which took place when development of the steam locomotive and rapid railway construction diverted transportation from water ways, canals and the Conestoga wagon train to the railroads. In the short space of 10 to 12 years we have witnessed the diesel locomotive become the favored type of railroad motive power until today all locomotives constructed for use on major American railways, with exception of a few steam locomotives for specialized services, are of the diesel type. At the present time approximately as many diesel locomotive units are in service on railroads under our

jurisdiction as there are the old faithful and reliable steam locomotives. This change in power type is bound to have extensive and far-reaching effects upon the various crafts. Because of the reduction in number of steam locomotives the amount of boiler work on the various railroads has decreased with consequent repercussions upon your craft. It may therefore be necessary for some of the younger members to adapt themselves to the changing conditions. Last year I mentioned that it is economically unsound not to utilize to the utmost the trained services of men experienced in your art and suggested that fuel and water tank work on diesels offered a field where the boiler maker would be particularly valuable. It would also be apparent that the boiler maker is, because of his layout training and experience in heavy plate work, particularly qualified to be affiliated with the welding field. His experience with metal forming and working together with knowledge of the behavior of metal under load would add perspective to his ability in welding activities. . . . "

In speaking before the Locomotive Maintenance Officers' Association Mr. Davidson emphasized the importance of teamwork in railroad operations.

"After a lifetime of work connected with locomotive operation and maintenance, the major part of which involved furtherance of locomotive safety," he said, "I have been impressed with the great number of instances where the victims of accidents were not primarily responsible for the basic cause of the accident. It is an ironic turn of fate that makes one man suffer because of the shortcomings or neglect of another. This is particularly true of railroading where one group maintains equipment that is operated by other members of the railroad team. . . ."

"I wish to call attention to some of the developing types of defects in diesel power which have been responsible for accidents and casualties and which should be carefully watched. The transition from steam to diesel power has been extremely rapid and the trend still continues. This change has developed many troublesome problems because of the closer tolerances found in diesel engines and the amount of electrical equipment involved.

"With exception of the oil-fired flash type heating boilers used on diesel units which have been responsible for relatively few accidents, there is not the danger of accident from large volumes of high-pressure steam encountered in steam locomotive practice. The majority of accidents in connection with diesel-electric units have, to the present, fallen into the categories of those caused by wheel failures, bearing failures, electrical equipment, falls, crankcase explosions and fires. . . .

"Based on the record of two serious derailments caused by broken wheels and failure of a considerable number of other wheels I would say that defective wheels constitute a source of major potential hazard in diesel operation. The failure in service of any one of these wheels can be the cause of a serious accident, so the gravity of the situation is apparent. I urge that all attention be given to inspection of diesel wheels by railroad mechanical forces. The problem of detection of defective conditions rests with the railroad mechanical forces if the situation is to be controlled."

In his remarks before the Railway Fuel and Traveling Engineers' Association Mr. Davidson spoke on the importance of the adequate preparation of inspection reports and of carrying through the corrective measures needed. If we are to know what we are doing in matters affecting locomotive maintenance, performance and safety, Mr. Davidson said, we must have records whereby results can be analyzed and difficulties traced to their source. Records mean reports and to be of any value the reports must be accurately and conscientiously prepared by competent persons having requisite experience.

Upon passage of the Locomotive Boiler Inspection Act and subsequent amendments, the various inspection forms, based upon requirements of the approved rules, were developed and placed in use. The daily locomotive inspection report, Form No. 2, is a very important report from the standpoint of the enginemen. This report is the means whereby the engineman can inform the mechanical department of defective conditions that are in need of correction. "Brevity," he said, "may be the soul of wit but on a daily report enough information as to the source and nature of the difficulty experienced should be shown to indicate to the shop forces the kind of attention necessary to effect a proper and lasting repair.

"In the course of investigation by the Bureau of reportable accidents many instances have been found where the defect responsible for the accident had been reported a number of times prior to the accident. Such conditions indicate that repairs, if made, either were not properly made or the basic cause of the defect had not been determined. Attention could profitably be devoted to the manner in which defective conditions are shown on daily reports and to corrective procedure employed by maintenance forces to rectify the defective conditions.

"What has been said concerning reports for steam locomotives applies with greater emphasis to diesel-electric locomotive units. Because of much closer tolerances, electrical equipment, particularly units of control equipment, must be maintained to a standard approaching perfection. A slight decrease in condition may result in a locomotive failure or an accident with attendant casualties.

"A considerable number of accidents have occurred on this type of equipment which were caused by defective electrical contactors and in which injuries resulted from electrical flashovers or explosions. In this equipment failure frequently occurs suddenly without the warning that is often found in steam-locomotive practice. It is therefore essential that terminal inspections be thorough and comprehensive if road failures are to be avoided.

"Inspection reports are the sign posts which are the guides to proper maintenance and safe locomotives. They are not merely annoying paper work but are the index of locomotive safety and economical operation."

COORDINATED REGISTRATIONS—1950-1951-1952

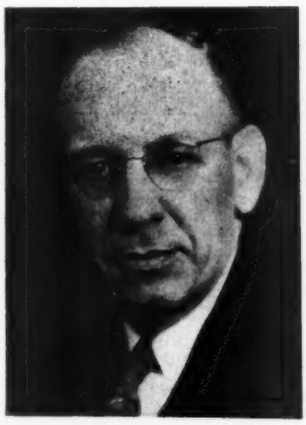
Associations	1950 Railroad Men	1951 Railroad Men	1952 Railroad Men
Air brake	176	280	135
Master Boiler Makers'	216	215	127
Car Department Officers'	373	563	523
Locomotive Maintenance Officers'	746	1,017	840
Railway Fuel & Traveling Engineers'	475	268	433
Electrical Sections, A.A.R.	175	155	205
	2,161	2,498	2,263*
	Supply Men	**Supply Men**	**Supply Men**
Railway Electric Supply Manufacturers'	236	...	305
Allied Railway Supply	737	...	1,003
Allied Railway Supply, Mechanical	...	1,152	...
Allied Railway Supply, Electrical	...	168	...
	973	1,320	1,308
Total	3,134	3,818	3,571*

Note: The 1950 and 1952 exhibits were of electrical equipment and the 1951 exhibit was mechanical equipment. The supply companies' registration of representatives, therefore, is not directly comparable.

*These totals do not include 361 associate members and guests registered with the six associations, most of which, presumably are supply men also registered with the two supply associations and included in their totals. In addition 803 ladies were registered.

Boiler Makers Celebrate 50 Years of Service

Expansion of association interest into new fields resulting in increase in membership



H. C. Haviland, President
(Supervisor boilers, N.Y.C.)

H. R. Barclay, Vice-Pres.
(General boiler inspector, G. N.)

A. F. Stiglmeier Sec.-Treas.
(General supervisor boilers and welding, N. Y. C. System)

ORGANIZED in 1902 the Master Boiler Makers' Association can look back on a half century of service to the railroads. At its 35th annual meeting it recognized the contributions made by the association to the development and maintenance of the steam locomotive boiler during this period. It also recognized the loss to its organization resulting from the current transition of motive power from steam to diesel-electric.

The highlight of its 50th anniversary celebration was an address by C. B. Peck, *Editor*, Railway Mechanical and Electrical Engineering, who reviewed both the history of the association and that of the steam locomotive boiler during the past 50 years.

Mr. Peck told the formation of the association in 1902 at St. Louis as the International Master Boiler Makers' Association and its later amalgamation in 1907 with the Master Steam Boiler Makers' Association. He reminded the meeting that three of the 66 charter members of the International Master Boiler Makers' Association are still living—J. A. Doarnberger, its second president, and retired master boiler maker of the Norfolk & Western; F. A. Batchman, retired boiler foreman of the New York Central, and John McDermott, retired from the Illinois Central. Mr. Peck paid tribute to its officers in the early years and especially to its secretaries, Harry D. Vought, who held the position from 1908 to 1929 and to his successor, Albert F. Stiglmeier, general supervisor of boilers and welding, New York Central System who done an outstanding job since that time. [Mr. Stiglmeier was re-elected secretary of the association for 1952-53—Editor.]

In speaking of the character of the association Mr. Peck said, "This body, from the beginning has been an organization of individuals, all of whom value their independence highly but who know how to work together effectively for the accomplishment of their purpose." "The committee reports," he said, "have offered each member valuable help in setting up yard sticks with which he can measure his own methods and see their strong points as well as their weaknesses. Such reports have served the real needs of the members so far as practice is concerned. The reports which have dealt with the science and engineering background of some phases of the master boiler makers' responsibilities have been broadening and have made the association a leader in its field."

President H. C. Haviland, supervisor of boilers, New York Central System—East, in his opening address acknowledged the adverse situation confronting the association and its members. Evidence of what the association is doing about the situation was presented by Mr. Haviland when he welcomed the new members, many of them welding and water service supervisors (127 new members joined the association during the past year). He also told the individual members, "There is little to be gained by bemoaning the fact (dieselization). We can spend our time more wisely by adjusting ourselves to the situation as rapidly as possible." How boiler supervisors can adjust themselves is covered specifically by the first of the association's reports presented in this issue.

The association had four guest speakers. In addition to the historical review presented by Mr. Peck the meeting was addressed by W. C. Wardwell, superintendent of equipment, Lines East, New York Central; E. H. Davidson, director of the I.C.C. Bureau of Locomotive Inspection, and C. T. DeWitt, superintendent of safety, Northern Pacific.

Mr. Wardwell spoke on the benefits to the railroads derived from association activities and on possible future work on the Master Boiler Makers' Association. Benefits he mentioned included: (1) The application of the ideas presented in the technical papers and discussions result in large money savings; (2) in preparing papers men become interested in means for improvements that would otherwise be uncovered; (3) the meetings present an opportunity for open discussions on all phases of maintenance; (4) supervisors by personal discussions with fellow members solve in a few minutes many problems that have bothered them for a long time; (5) a large geographical coverage of subjects is made possible by the continent-wide scope of the attendance; (6) attendence stimulates the thinking of supervisors and opens new avenues of thought; (7) the friendships made at meetings provide contrast for later correspondence on mutual problems, and (8) the printed proceeding make available valuable facts on new or better methods of handling maintenance work.

Mr. Wardwell emphasized the fact that new associations were not required to work out the many new maintenance problems presented by dieselization. In this connection he praised the M.B.M.A. for its interest in the welding of diesel parts, in steam generator maintenance and in diesel water supply. He also called particular attention to the many boiler supervisors that have "swung over" from boiler to mechanical and electrical maintenance—a good supervisor need not be confined to the special field in which he was trained.

Mr. Davidson's address before the association has been consolidated with addresses he made before two other associations and will be found elsewhere in this issue.

Mr. DeWitt said in speaking on safety "We learned long ago that the best engineering and the best mechanical safeguards are not in themselves enough to protect employees from accidents. With something that sometimes amounts to genius, men will get hurt on machines we thought were fool-proof." Education in safety, he said, is the principal answer—"We should think and talk safety continually to remind men of the impartant things they are constantly forgetting—they must be taught, told, retold, and sold on safety." Mr. DeWitt told the audience that "If we get discouraged because the 5 year old safety story needs constant repetition, let us remember that the twenty centuries of the Christian religion has not eliminated the need for the ringing of church bells to remind people of their spiritual obligation".

A special paper covering 50 years of water treatment progress prepared by Carl A. Harper, past president of the association, was resented to the meeting. The paper reviewed the improvements in boiler performance and the large savings made possible by water treatment since 1902 and pointed out that additional work needs to be done in this field to improve the efficiency of the remaining steam locomotives, the stationary boilers and, in many cases diesel-electric locomotives.

Two of the five technical reports presented at the meeting are omitted from this issue. One was a report on "Advantages and Disadvantages of Steam Generators for Stationary Steam Heat Plants." This report was presented by Chairman A. E. DeForest, assistant to superintendent equipment, New York Central System (Michigan Central District). The second was entitled "Study and Recommendations on Methods of Staying Side Sheets and Crown Sheets to Eliminate Threading of Holes," presented by Chairman F. R. Milligan, general boiler inspector, Canadian Pacific.

The report on steam generators covered both fire-tube and water-tube designs. The committee said that "the use of packaged steam generators to replace boilers of conventional design has been based upon the marked savings in labor costs and supervision made possible by automatic and semi-automatic operation." It was the committee's opinion that the packaged steam generator is satisfactory for small plants but it cautioned that feedwater treatment is essential to minimize maintenance costs.

How Boiler Supervisors Can Educate Themselves for Other Positions

(This subject is of primary interest to boiler supervisors and to many other mechanical supervisors who have to meet the situation caused by the rapid replacement of steam locomotives by diesel-electrics. The committee preparing this report was comprised of both railway officers and boiler supervisors—Editor)

The introduction of the diesel-electric locomotive as the principal motive power unit on our major railways, has created a situation whereby a more or less complete re-adjustment of the duties and assignments allotted to the various crafts in the railway repair shops must be effected.

Those formerly concerned with the running gear of the steam locomotive and tender will find their sphere of activity somewhat curtailed. Much of the old familiar detail, such as rod and motion work, is replaced by the lighter, differently arranged and functioning detail parts of the diesel engine. The numerous auxiliary devices or accessories of the steam locomotive are now replaced by an entirely different set of equipment, the construction and operation of which differs entirely from that formerly used.

It would thus appear that no shop craft involved, is entirely free from the necessity of changing their outlook, acquiring new knowledge and readjusting themselves to meet the changed conditions. In this respect all may be said to be starting more or less from scratch.

The solution to the boilermaker supervision problem should not be difficult if approached from the correct angle. First, it must be borne in mind that the railroad companies will not seek, by themselves, to teach boiler supervisors new trades. This is the sole responsibility of the supervisors themselves.

Secondly, the boiler supervisor desirous of preparing himself for the duties of a supervisor in another craft must clearly recognize that no average supervisor can train himself to be an expert supervisor in all crafts, nor should he attempt to do so. Further, it is not necessary, in order to supervise mechanics of a craft other than his own, that he qualify as an expert in *all* branches of any one craft. In nearly every craft the large majority of both craftsmen and supervisors specialize to some extent. In practice, for example, you seldom find a machinist gang foreman who is an expert in machine tool work, air brake work, tool making, locomotive valve setting, erecting work and the preparation for welding of various locomotive parts.

A good supervisor is generally a specialist in one of the several branches of his trade and in addition has a workable knowledge of the other branches. In our own craft, you will find those who specialize, for example, on layout work, on new boiler constructions, on shell courses and the design and application of patches, on firebox work or perhaps the so-called sheet iron gang. Others are expert on flues and specialize on flue shop design, operation and the handling of flues. There are also those who specialize on flanging and press work.

It would then appear that boilermaker supervisors who wish to continue on as supervisors in the railroad field after the abandonment of steam locomotive must either have the seniority and knowledge to retain those remaining boiler supervisory jobs on diesel locomotives, or else make a survey of the possible positions which may be made available to them as supervisors of other crafts and prepare themselves for them. In this connection, it is well to consider what other occupations are more nearly comparable or easily associated with the boilermakers craft. For example, welding is an old story to boilermakers and is usually performed to much more rigid specifications than for other crafts.

Looking over the new motive power it would appear that the boiler making craft can rightfully claim the following details as coming more within their field than that of related crafts: underframe, cab structure, pilots, cabinets, fan casings and ducts, fuel tanks, water tanks, air reservoirs and heating boilers, and terminal installations for servicing diesel locomotives including fuel tanks, water tanks, sand containers and water treating facilities.

The construction of the diesel locomotive and the conditions under which they operate indicate that a considerable reduction in the amount of work accruing to the boiler shop may be expected. The extent to which this expectation may be realized will depend on many factors encountered during day to day service and may well prove to be much smaller than has been so freely predicted. Supervision and handling of water treatment for engine cooling and train heating boiler requirements is a continuation of present boiler water treatment service and should remain under our jurisdiction.

Members of the craft, and supervisors in particular, should set about acquiring a general over-all knowledge of the construction and the functioning of the diesel-electric locomotive. Such knowledge need not be as complete and detailed as that of the specialist, but particular attention should be given to a thorough understanding of all cooling water circuits and devices and the train heating boiler construction and methods of operation and control. Those engaged in roundhouses or in supervision where contact is made with operating departments would do well to familiarize themselves with the duties and requirements of roundhouse terminal administration and the train running rules to better prepare themselves for future promotion.

What can a man do to better fit himself for advancement. There is no definite pattern for success. There are, however, certain qualities that stand out in men that have achieved success and in the absence of a definite plan it may be well to try and emulate these. These shape up very nearly and in the order as follows: Appearance, degree of knowledge held in the field in which he serves and the ability to speak and impart his knowledge to others.

A man's appearance accounts for much. Whether he be clothed in an expensive business suit, a suit of homespun or overalls matters little; how he wears them matters much. His carriage and neatness of attire represent his full face value which frequently to the stranger is his first and quite often last impression and may result in the acceptance or rejection of the individual.

It would appear that those selected have had in addition to appearance and skill, the ability to sell themselves. This too is a necessary and valuable qualification. Men that attain the position of supervisors or leaders discontinue doing any of the actual work

themselves. They assume positions where they must be able to impart these ideas successfully to other men so they will realize the logic in them. To impart one's knowledge to another requires the ability to speak or talk depending on whom is to be convinced. If it be the official staff above the supervisor, it will stand him in good stead if he is able to speak presenting the facts and important matters in such a manner that those who are not fully conversant with the problem will fully understand. If it be the workman in the shop, then in good old fashioned shop talk that they will readily absorb. One way or the other a man must have the ability to speak or talk before a group or an individual.

With the difficulty now experienced in obtaining dependable supervision, men who are resourceful and who are willing to assume responsibility, it should be no problem for a former boilermaker supervisor who has properly prepared himself as above to convince management of his ability to assume a position of supervisor in a craft or crafts other than his own. Relief positions, brought about by the five-day week have provided excellent opportunities for training as they often cover supervision over mechanics of several crafts and varied responsibility as regard the operation of a terminal. These positions, due to odd hours, Sunday, and holiday work and changing tricks, are often more easily available than straight craft supervisory assignments. They should be eagerly seized upon by boiler supervisors seeking advancement.

In speaking before the Master Boiler Makers' Association in 1951, Mr. D. V. Gonder, Assistant Vice-President of the Canadian National Railways, paid high tribute to the boiler makers, and gave some advice that can well be repeated here: "You must be bold enough to face the future with courage and confidence. You have good reason for an abundance of both attributes. None of the mechanical trades demand more courage than boiler making. None has a better record of the type of conscientious, painstaking, successful workmanship that breeds justified self-confidence."

While many railroads have spent much money and time over the years to train and develop supervisors, this by itself is not sufficient. The appeal for supervisors with high qualifications must be genuine, in earnest, and have a more permanent reward, otherwise the incentive for men to train themselves for leadership in the railroad field will be lost. With the acquisition of diesel power certain crafts have borne an undue burden in the reduction of mechanical and supervisory forces. In a large measure on certain railroads this has been due to the influence and power exerted by larger and stronger crafts on management. Also on many railroads where the top level personnel have all come from one craft they have been prone to recruit additional and replacement personnel from the same group. This policy does not appear to be fair to all the crafts that converge to make a successful railroad nor does it appear to offer to the railroad the best plan for efficient leaders in its official staff. Knowledge is not the birthright of any one individual, any one class or any one group. It is the common heritage of all. Many men responsible for the high development of the railroads were never engaged primarily in the railroad field. Through the years many men from the ranks of boiler supervisors have served in high official capacity on several railroads and distinguished themselves in a very creditable manner. Many men from the boiler crafts have entered the railway supply and other railway service fields, attaining positions of prominence and technical skill. That more men from the ranks of boiler supervisors have not assumed positions of high capacity on all railroads is due to the policy of the railroad in drawing its supervisors from one or two crafts and not due to a lack of ability in the boiler supervisors' makeup.

The boilermaking craft in general, like the members of all other crafts and allied workers in the railway mechanical field, from top to bottom, are greatly concerned by the passing of that faithful old machine we all knew and loved so much, and the necessity of taking drastic re-adjustment in ways of thinking and working. Nevertheless the challenge is there and the fortitude to meet it lies in the hands of the individual to a great extent.

Instruction books, issued bv the locomotive builders, articles in technical magazines and instruction courses conducted by the railways, as well as numerous books by various authors covering the subject are available, but the net results rest with the individual and his determination to prepare himself to fit into the new scheme of things.

There are those who take a gloomy view of the boiler craft's future, but turning for a moment outside the railway field, such people would do well to take note of the tremendous increase in the number and colossal size of the stationary steam generating units built and being built throughout this continent for public utilities and to meet the needs of the rapidly expanding chemical and pulp and paper industries. On the railways as well many old and new power plants are being modernized, and it would appear that steam is still and will continue to be in demand for many varied purposes and boiler construction and supervision will be with us for some time to come.

We fully realize that the supervisors have a challenge to meet during the transition period and are sure that it will be overcome if the railroad executive will only extend to the boiler supervisor confidence when promotion arises that he will be accepted on equal terms with the personnel of other crafts. Through the medium of this paper we hope to extend wise counsel so that the railways as well as the supervisor will benefit to the fullest by our efforts.

The boiler ranks have many leaders and men with outstanding ability for sale. It is recommended that the Master Boiler Makers' Association through the medium of its office by personal contact or transcript, place before the proper authorities of the American Association of Railroads a proposal that the A. A. R. in turn ask that top level management give more consideration in the selection of its supervisory forces to those leaders that come from the ranks of boiler supervisors that have and will continue to prove themselves able.

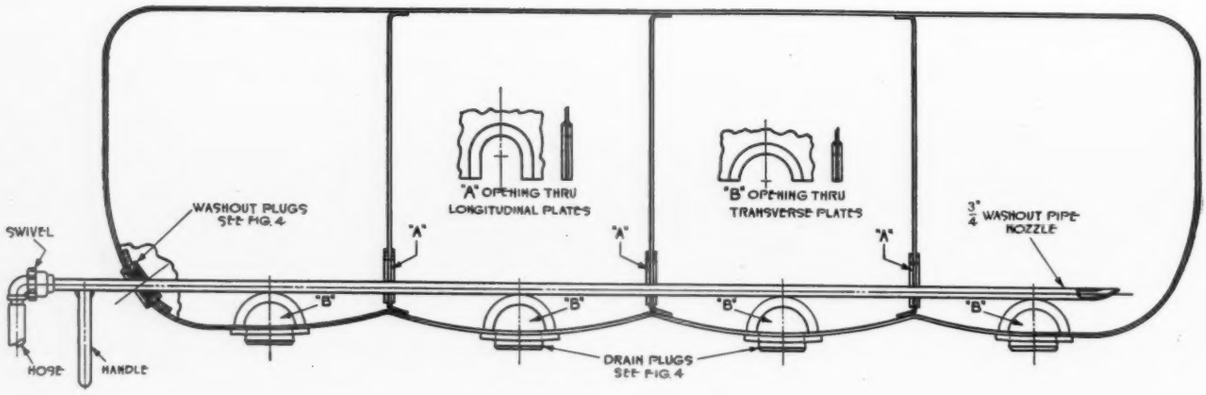
Diesel Water Tanks

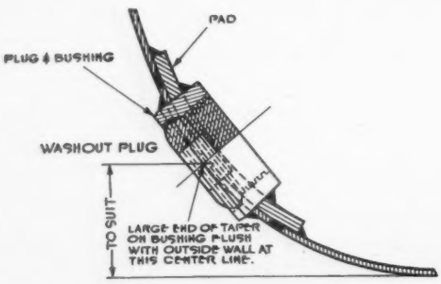
The committee reviewed the many difficulties with steam generators resulting from dirty water tank conditions, particularly on the earlier diesel locomotives, and then made the following comments and recommendations.

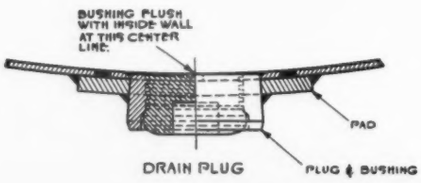
Since the beginning of passenger dieselization and steam generators, the water supply tank has been a great source of trouble. Difficulties as noted in previous paragraph is that baffle plates arrangement is such that it is impossible to properly clean each section. In most water we have corrosive substance, causing scale, and deterioration of metals. An Eastern railroad says, "We realize that this difficulty can practically be eliminated by properly treating the water before it enters the supply tanks." But this is not always as easily accomplished as it is to talk about it. There are the original costs for installing wayside treating plants at various points which may prove too costly, or for some other reason cannot be made, in which case water must be treated by some other method. It is when we are treating water by these other methods, and we believe most railroads do, that the best possible care must be given to the water supply tanks. If the interior of the tank is not thoroughly cleaned every month, these impurities are carried along with the water into the component parts of the generator and separator which frequently cause failures. Failures may be due to several component parts such as strainers, valves, piping, and generator coils. If scale formation is great enough, generator coils will blister, burn, or crack.

The committee believes that these water storage tanks are constructed in such a way, when received from the locomotive builders, that proper cleaning is impossible. We also believe that the manufacturer should be made to correct the condition and adopt a standard tank or tanks of suitable design and placed on the locomotive so that it would be possible to clean aand inspect these tanks. It should have sufficient openings in splash plates, so arranged they would be in parallel with the wash out plug openings, as shown on accompanying illustrations, and standard washout plugs. We also recommend to the manufacturer that before these tanks are assembled, the interior of all tank plates be given at least two coats of Apexior No. 3 or its equivalent.

If these recommended modifications are made by the builders, we believe the difficulty experienced with tank deterioration, clogged strainers and pipe connections, renewal of coils, etc., can be eliminated on steam generators, thereby saving the railroads costly expenditure in loss of steam generators. We know these difficulties can be overcome if we all agree that some changes must be made either by the railroads themselves on locomotives already in service, and by the builders on new locomotives.



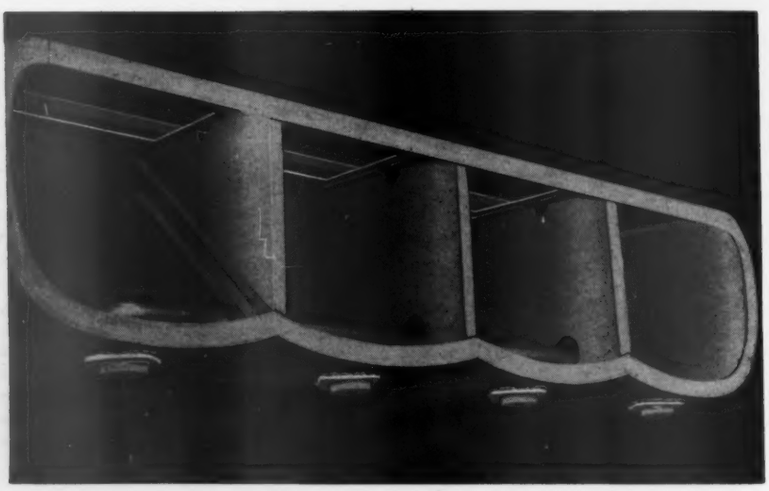




▲ Water-tank section showing openings in baffle plates and washout-pipe nozzle. Details of washout plug are shown in accompanying drawing.

▲ Application of bushing and plugs.

Application of washout plugs to ➤ diesel water tank. Plugs can be applied to one side or staggered.



◄ Application of washout plugs to bottom of diesel water tank to provide proper drainage of sediment and other foreign matter.

The water storage tank recommended by this committee as the most desirable for us to maintain is the one shown in the accompanying illustrations. Located under the frame of the locomotive, it can be handled with more economy, because of easy access to washout plugs and because it can be easily inspected and washed thoroughly without harming the electrical equipment.

Again we take this opportunity to say to the builder, why make the last place available on a diesel locomotive the place for water tanks and generators. Without a steam generator which will function properly in the winter-time, the diesel engine is of very small value to the revenue passenger who may get to his destination but will curse the railroad for its cold and uncomfortable cars. In this day and age, and with competition so keen, the passengers must be made to feel at home and be comfortable. Otherwise, they are going to seek other transportation means.

Welding Diesel Locomotive Parts

The basic construction of the diesel locomotive is somewhat different from that of the steam locomotive but the problems of maintenance are very similar in that both are composed of many parts subject to wear and occasional breakage. It would not be practicable to replace all worn or broken parts with new parts. The railroads are indeed fortunate to have available to them a number of processes whereby many worn or otherwise defective diesel locomotive parts may be satisfactorily reclaimed at considerable savings. The electric arc and the oxy-acetylene flame are two of the older and more familiar processes which are indispensable for maintaining both steam and diesel locomotives. The inert-gas shielded-arc process is also finding its place in the reclamation and repair of diesel locomotive parts.

A notable achievement of the inert-gas shielded-arc process is the automatic welding of aluminum pistons in which the filler metal is fed from two coils, one wire carrying the current while the other furnishes additional metal to increase the rate of deposition. Cracked aluminum pistons are repaired by a manual adaptation of this process. The filler metal, which also carries the current, is fed from a reel through a portable hand gun and is consumed in the arc to form the welding puddle. Some railroad shops are using the inert-gas shielded-arc process with a nonconsumable tungsten electrode for welding cast iron cylinder heads. This process, using both tungsten and consumable electrodes, is also being used for welding aluminum and stainless steel parts and for bronze overlaying.

In some cases, where applicable, and where the required build-up is small, metal spraying has proved to be very economical. Present indications are that the use of the metal spraying process, using molybdenum wire, will be extended to include many more diesel locomotive parts.

The knowledge gained through many years of experience in welding on the steam locomotive is being used to good advantage on the diesels. However, a great deal of experimental work has been necessary to overcome some of the new problems which have developed as the diesel units began to accumulate mileage. Suppliers of welding equipment have assisted greatly in developing new equipment and methods. As a result of their research, engine valves and aluminum pistons may be built up automatically much more economically than by the manual method. Furthermore, materials which are harder and tougher than the original material may be used for building up these and other parts, thus increasing the service life of the reclaimed part beyond that of a new one.

It is not the purpose of this report to describe in detail every welding operation which may be found on a diesel locomotive, but rather to call attention to the more important welding problems and to offer recommendations for performing the work efficiently and satisfactorily. Many of the welding operations do not require more than an average skill on the part of the operator. However, there are certain jobs which require careful study and planning in order to obtain the desired results.

Most of the critical welding on a diesel locomotive is found on the diesel engine. The early types of diesel engines had cast iron crankcases and cylinder blocks, a number of which are still in use on switching locomotives. The modern diesel locomotive engine consists of a crankcase and oil pan fabricated entirely by welding. The main parts, besides the crankcase and oil pan, are cylinder liner cylinder heads, cylinder head retainers and moving parts such as pistons, valves, connecting rods, crankshaft and camshaft and several bearings of various sizes. There are also several appurtenances attached to the engine which contributed to the proper functioning of the power plant.

Automatic equipment for reclaiming piston ring grooves on aluminum diesel pistons. To the right of the lathe is the piston preheat furnace.

Automatic welding equipment mounted on lathe. Note aluminum piston prepared and mounted for reclamation.

When it is considered that there are many machined parts and working parts that must be held to very close tolerances, it may be readily seen how important it is to control expansion and contraction when it is necessary to make repairs to the crankcase or oil pan by welding. Welding indiscriminately on any section of these engines and failure to control the heat input while welding would most certainly disrupt these close tolerances and cause subsequent failure in some part of the engine. When items such as pistons, valves, cylinder heads and cylinder liners require welding, these parts may be prepared and welded under conditions which may be carefully controlled. As these parts are accurately machined after welding the small amount of distortion which is present may be disregarded, provided there is sufficient material to permit machining to the required dimensions.

The cutting torch is being used quite extensively on the diesel locomotives. However, due to the necessity for avoiding harmful distortion, an acetylene cutting torch should never be used for removing any cracks or defects in the engine crankcase assembly except as a last resort. Chipping or grinding is preferred for this purpose.

Operator welding cracked piston heads with inert shielded arc gun using consumable aluminum electrode.

Cylinder head preheat furnaces with control panel in background. Furnace controls are equipped with visual and audio alarms to safeguard against overheating.

General Rules for Diesel Welding

There are several rules which apply generally to welding on all classes of diesel locomotives, regardless of make. The placing of the welding ground, for instance, might result in considerable damage if not properly located. The welding ground should be connected to the part on which welding is to be performed in such a manner as to prevent any possibility of the welding current passing through ball or roller bearings or any other vital parts where arcing could result in serious consequences. Also, every precaution must be taken to protect machined parts against arc burns and weld spatter by properly covering exposed surfaces. Arc burns may be caused unintentionally by loose ground or by accidental contact of electrode or holder. Several failures on steam locomotives have been traced to this cause.

Extreme care must be execised when welding exhaust stack assemblies of diesel engines so that weld spatter and welding slag are not permitted to drop inside of stack where they can gravitate onto valve seats or piston assemblies.

The prevention of fires is of the utmost importance. Oil, which is essential to the operation of a diesel engine, presents an ever-potential fire hazard which is difficult to control. Any location where there is an accumulation of oil must be carefully protected against sparks. Every precaution must be taken to put out instantly any fire which may be started. Even small fires have been known to cause considerable damage to electrical equipment. Sometimes inflammable solvents are used for cleaning. Before doing any burning or welding, it must be definitely determined that there is no danger of fire from this source.

On locomotive nose repair, torch work must be avoided around the windshield and headlight contours as these contours are generally blended out with body solder which melts at a relatively low temperature.

Fuel tanks, which are fabricated entirely by welding, require that certain precautions must be taken when it is necessary to make repairs. Before any cutting or welding is to be done on fuel tanks, they must be thoroughly cleaned of all materials which are liable to cause fires or explosions. As a general rule, thorough steaming of the interior of fuel tank for a period of 12 to 18 hours, after it has been completely drained, followed by flushing with warm water, will remove the danger of fire or explosion. All vents must be kept open during cutting or welding. Recommended procedures for preparing fuel tanks for welding may be obtained from the American Welding Society, the American Petroleum Institute or the National Board of Fire Underwriters. In some cases, small leaks may be welded without draining the fuel, but before it is safe to do so, the tank must be completely filled with fuel oil. If possible, the leak should be caulked prior to welding.

Water tanks, which are also fabricated by welding, may be repaired without any difficulty provided they are clean and free from foreign matter. Until fairly recently, the majority of water tanks for diesel locomotives were manufactured with no provisions having been made for adequate cleaning. The importance of regular cleaning of these tanks has been recognized and the subject has been covered very well by a report presented at this meeting. There are a great number of water tanks in service on which it will be necessary to provide a means of cleaning. Welding is playing a very important part in this program.

Parts which are to be welded while in place on the locomotive should be made accessible as possible. To enable the welding operator to produce a welded joint of the highest quality, parts which interfere should be removed wherever possible. This will also facilitate the preparation, cleaning of slag and final finishing of the weld.

The size of the welding groove should be kept to a minimum consistent with good welding practice. Complete penetration of the joint with a minimum amount of filler metal is essential to prevention of excessive distortion. Short welds and frequent peening help to control stresses which, if allowed to build up, could result in serious damage. If at all possible, the back of the weld or plate should be "bucked up" while the weld metal is being peened. Where backing plates are not used, the root side of the weld should be cleaned and welded also, if it is possible to do so.

◀ Welder converting E.M.D. No. 1 type cylinder liners to No. 3 type by oxyacetylene welding.

Electrodes for Diesel Parts

The selection of the proper welding electrode or rod to be used on the various parts of the diesel locomotive is a problem which should be carefully considered. The extensive use of alloys in diesel locomotive construction has necessitated the use of several types of electrodes and rods which were not required for welding on steam locomotives. However, all of the alloys being used are readily weldable, and the only requirement is that the electrodes be of a tensile strength comparable to that of the alloy to be welded. Alloy metals are used for stress plates in diesel engines and also in certain cast-steel truck frames. Some manufacturers use alloy steel for fabricating the complete crankcase assembly. In order to preclude the possibility of using the wrong electrode for a certain job, it is suggested that electrodes of the higher tensile strength be used for all welding on engine crankcases, truck frames and parts which are subject to high service stresses. A.W.S. types E-7010 and E-7016 welding electrodes are recommended for this purpose. However, when it is necessary to build up surfaces which are to be machined, A.W.S. type E-6012 welding electrodes are recommended because of their better machining qualities.

Water tanks, fuel tanks, battery boxes, pilots, cabs, underframes, superstructure and other mild steel parts may be welded with A.W.S. types E-6010 and E-6012 electrodes.

Originally, type 310 lime-coated stainless steel electrodes were used for attaching hardened wear plates to truck pedestals and roller bearing housings. However, due to the difficulty which was experienced in removing the stainless steel deposits, A.W.S. type E-6016 electrodes have been substituted with satisfactory results.

Stainless steel and aluminum parts must, of course, be welded with welding electrodes or rods of the proper composition. Nickel base electrodes are used for arc welding of cast iron crankcases, cylinder liners and a few other cast iron parts. In some cases, a phosphor bronze electrode may be used for this purpose. Cast iron cylinder heads, however, are welded with the oxy-acetylene flame or inert gas shielded arc process, using a rod of regular cast iron composition or an alloy of nickel-moly cast iron.

Bronze welding is used for repairing and building up certain castings and for building up worn parts of electrical equipment. This process is not used as extensively on the diesel locomotive as it was on steam. However, there are a sufficient number of parts on a diesel locomotive—which would be difficult to repair by any other method now known—to warrant bronze welding.

Copper piping is used quite extensively on diesel locomotives. Due to vibration stresses, the joints are brazed together with a silver brazing alloy which is preferable to solder.

Certain parts of steam generators are made of high heat-resistant materials. One of these materials is inconel the welding of which requires an electrode high in nickel and chromium. Electrodes containing 80 per cent nickel and 20 per cent chromium are recommended for this purpose. On parts subject to severe abrasion, such as truck equalizers and buffer castings, wearing surfaces may be hard surfaced with abrasion resistant electrodes. Worn diesel engine valves may be built up with a non-ferrous alloy of tungsten, chromium and cobalt applied with an oxy-acetylene torch flame, either manually or automatically.

Centralized Operations Best

In order to take full advantage of the benefits of a diesel parts reclamation program, it is necessary to centralize operations at one point on the railroad where welding operators and supervisors may be properly trained. Much of this work requires a highly specialized skill which can be acquired only through hours of practice and experience. Frequent changing of operators must be avoided if it is expected to keep production and quality at a high level. Another advantage of centralized operation is that in case of failures due to faulty workmanship, responsibility may be quickly placed and corrective measures taken.

As previously mentioned, recommended procedures for welding several parts of the diesel engine as well as a few other parts of the diesel locomotive, and which it is felt will be of interest to Association members, are described below.

Crank Case Lower Deck Repair (Electro-Motive 567 series engine)

This procedure covers repairs by welding to cylinder liner seats in lower deck when damage occurs through failure of piston or related parts. The connecting rod usually damages the two sides of the bore. Frequently, the liner support plate material in this area is badly battered and must be built up, as well as the liner seats.

Controlled cooling rack for cylinder heads. Note blackboards on each cover, indicating welding date, welder's number and removal date.

Suction pump and storage cabinet for removing flake asbestos from cylinder-head cooling compartment. A door is provided in the cabinet to remove asbestos for application to welded heads to retard cooling rate.

The first step is to drain the crankcase and remove the complete cylinder assembly from damaged cylinder bore, and also the opposite cylinder assembly. Then remove all broken pieces of cylinder liner and other foreign material and clean both crankcase and oil pan well. Close all openings through which welding spatter and slag may enter the crankcase or oil pan. Cover exposed crankshaft journals to prevent weld spatter and chip damage. Insert metal chute under opening in lower deck where welding and boring will be done.

After the crankcase and oil pan have been thoroughly cleaned and all openings have been completely closed, the next step is to prepare the damaged area for welding. This is done by chipping off burrs and grinding the damaged surfaces smooth.

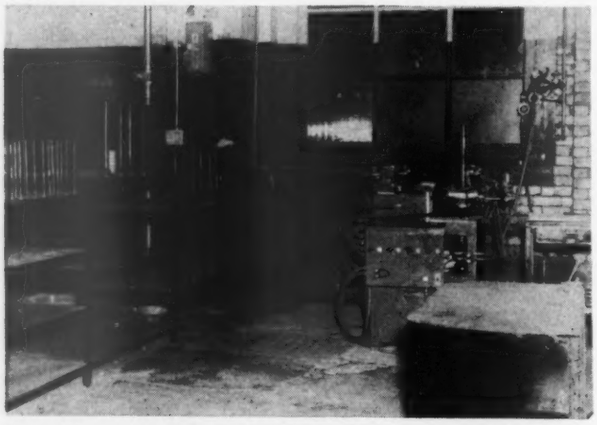
A.W.S. type E-6012 electrode is recommended for build-up welding because of its slagging and rapid build-up characteristics and also for its good machining quality. Maximum diameter of electrode recommended is $\frac{5}{32}$ in. The weld metal should be applied in short beads, using a back-step sequence completely around seat. Peening each bead with a pneumatic tool will help to remove slag and reduce stress. In back-step welding, it is important that points where starts and stops are made are properly overlapped to avoid porosity and slag inclusions. In this type of build-up, it is essential that the weld metal be entirely free from defects. It is important, therefore, that all slag be completely removed before successive layers are applied.

To avoid excessive welding and to facilitate machining after welding, the minimum amount of weld metal to be applied should be checked with a suitable gauge having a movable indicator. The build-up should be sufficient to allow approximately $\frac{1}{8}$ in. for machining.

Cast Iron Cylinder Heads

Cracked and worn cylinder heads may be reclaimed by welding with either of two processes, oxyacetylene or inert gas shielded

Removing flake asbestos from welded cylinder head and cooling box with vacuum hose.



Automatic oxyacetylene hard-facing machine for reclaiming diesel-engine valves. Note valve mounted in machine for hard-facing and finished valves on rack back of the machine.

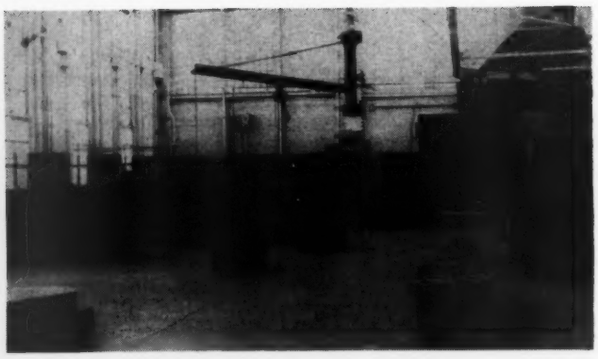
arc, using a cast iron welding rod. The rod may be regular cast iron or an alloy of nickel moly cast iron.

The cylinder heads are dismantled, cleaned and inspected for cracks and checked for wear. For inert gas shielded arc welding, the cracks must be grooved out, whereas for oxy-acetylene welding the cracks may be melted down with the torch flame and welded while the head is in the furnace. With either process the heads are first preheated slowly in a specially built furnace to a temperature of 1400-1500 deg. F.

When inert gas shielded arc welding is used, the preheated head is removed from the furnace and placed in an insulated box having a cover with small openings through which the welding may be performed, and welded before the preheat temperature drops appreciably. The reason for removing the head from the pre-heating furnace is that in inert gas shielded arc welding, the flame must be protected from drafts which tend to break the protective envelope of inert gas surrounding the puddle. The hot gases, issuing from the pre-heat furnace while it is in operation, are of sufficient velocity to interfere with the proper operation of the gas shielded arc method. To prevent hard spots in the weld, extreme care must be exercised when using the inert gas shielded arc process, so that the tungsten electrode is not permitted to touch the molten puddle.

When oxy-acetylene welding is used, the heads are preheated and welded in the specially built furnace where preheat and post heat temperatures may be accurately controlled.

After welding with either process, it is recommended that the heads be post heated at 1400 deg. F. for one hour and then placed in insulated containers, covered with an insulating material and allowed to cool slowly for two or three days.



General view of (a) automatic aluminum welding machine for reclaiming pistons; (b) automatic hard-facing machine for reclaiming engine valves; (c) cylinder-head welding, preheat furnaces and heat-control section of diesel reclamation shop.

Traction Motors

The traction motors are mounted in the truck and each motor drives a pair of wheels on the locomotive through spur gears. The alternating forces of propulsion and braking cause the various parts to eventually wear beyond acceptable limits. Parts which are subject to wear and which may be restored by welding are spline fits, frame bore, axle bore, bearing housings, gear case arms and motor support bearings. With the exception of the motor support bearings which are bronze, the worn surfaces of the traction motor may be built up with A.W.S. type E-6012 welding electrodes; ⅛ in. diameter electrodes are recommended in order to keep heat down to a minimum. To avoid local heat concentration, weld passes should be staggered throughout the area being built up. Each increment of weld should be peened with a blunt tool immediately after it is deposited to stress relieve the welded area. This will also serve to cool the part and clean the weld.

The motor support bearings wear down on the hub face and may be built up with bronze either by the oxy-acetylene, manual or inert arc process. To prevent the babbitt from melting out, the bearing is immersed in water up to a level to permit welding. Recently, tests have been conducted with inert gas shielded arc welding using a leaded bronze wire for building up the worn hub faces of these bearings. Results have been very promising.

Center Plate Assembly

The center plate assembly consists of a bolster made up of vertical and horizontal plates welded to the underframe of locomotive and to which is attached a circular center plate or casting. In some diesel locomotives, the center casting is an integral part of the locomotive underframe which is cast in one piece, being similar to the cast steel frame of a steam locomotive. However, the majority of diesel locomotive center plate and bolster assemblies are fabricated by welding, having either a fabricated or cast steel center plate welded on.

Failures have occurred in some parts of the center plate assemblies on all types of diesel locomotives except those having a one piece cast steel underframe. In some cases, it has been necessary to modify and strengthen the original design.

The welding of cracks in cast steel center plates while in place on the locomotive is not recommended. The cracked plates should be removed for welding and stress relieved before re-application. For removing welds, a cutting torch equipped with a gouging nozzle is recommended. After the center casting is removed, the weld metal remaining on the bolster should be chipped off and ground flush with plate. It is recommended that badly broken center castings or those containing serious casting defects be replaced with new ones.

A.W.S. types E-6016 and E-7016, 5/32-in. welding electrodes are recommended for welding the bolster plates and also for welding the center plates to the bolster. The center plate or casting should be welded to the bolster, using a backstep sequence of welding. The weld beads should be applied in approximately 6-in. increments and peened thoroughly after each bead is deposited. The back-step sequence is continued until all welding is completed.

Road Supervisors Talk Power and Personnel Problems

Chicago program dealt with diesel operation, training of crews, human relations and safety

THE pitfalls which dog the footsteps of diesel locomotive crews and their supervisors during the days of their early training were the subjects of several reports presented at the fifty-third annual meeting of the Railway Fuel and Traveling Engineers' Association held at the Hotel Sherman, Chicago, September 15, 16 and 17. Other subjects considered were human relations, safety, prevention of rough handling, trends in water treatment under dieselization, fuel for both diesel and steam, and the electrical control systems of diesel locomotives. A joint meeting of the Air Brake Association and the Railway Fuel and Traveling Engineers' Association was held on the afternoon of the first day for the discussion of a report on passenger and freight train handling and dynamic braking. The completion of a program of 15 reports, papers and addresses during the other four sessions precluded discussions at these session.

In opening the meeting the president, R. H. Francis, general road foreman equipment, St. Louis-San Francisco, spoke of the progress that is being made in the field covered by the association and said that there is no better way to keep abreast of this progress than to attend the annual meetings of the association to listen to well-prepared papers on important subjects, and to exchange ideas through discussion. The purpose of the association has always been, he said, to improve the efficiency of its members in their contribution to the success of the railroads in providing efficient transportation for the country.

Speaking of association affairs, he said that its membership had increased over that of a few years ago, and that it is now in sound financial condition.

Summaries or abstracts of most of the addresses, reports and papers follow. An address by Edward H. Davidson, director, Bureau of Locomotive Inspection, Interstate Commerce Commission, on the importance of making informative work reports is reviewed on another page in this issue. In addition to the reports and papers which follow there were presented a report by T. V. Methe, road foreman of engines, New York Central, which deals with the methods of teaching enginemen and firemen the functions and operation of Vapor-Clarkson and Elesco steam generators, two papers illustrated by slides of wiring diagrams, one by R. L. Henderson, Transportation Division, General Electric Co., on the Alco-G.E. excitation system, and the other by A. A. Mikolaitis, training instructor, Electro-Motive Division, General Motors Corp., in which he traced separately the seven electrical circuits which constitute the electrical system of the E.M.D. Model F7 locomotive, and a paper by T. L. Henley, chief fuel supervisor, Missouri-Kansas-Texas, which defined the characteristics of diesel fuel oil that are met in fuel specifications and described how they are tested. This paper will be the subject of an article in a later issue.

R. H. Francis
President
(General road foreman, equipment, St. L.-S.F.)

W. H. Fortney
Vice-Pres.
(Chief road foreman engines, C. C. C. & St. L.)

E. L. Reeves
Vice-Pres.
(Trainmaster, B. & O. Chicago Terminal)

L. H. Peters
Sec.-Treas.

Public and Employee Relations

In his address on the subject of Public and Employee Relations, L. C. Porter, vice-president, Texas & Pacific, voiced the conviction that no railroad can enjoy a full measure of success in its operations, and particularly in its competition for business, without good public and employee relations. The responsibility for the program he said, is not alone that of the public relations officer, but the primary responsibility of the department heads and subordinate officers who employ men and women and direct their work. The employees who come in direct contact with the public "will not ordinarily be more interested in the maintenance of good public and employee relations than the officers who direct and supervise their work," he said. "Nor can junior officers be expected to be more alert and interested than the heads of departments, especially of the operating and mechanical departments in which a very large number of railroad people are employed. It is equally the job of every railroad officer to study ways and means to improve the service, to look behind complaints for causes and, where they exist, take immediate corrective steps."

Public relations means association or dealings with people, and there are two kinds, good and bad. "It is my view," he said, "that the principal way for the railroad to create good public relations is through the right kind of attitude on the part of the employees toward the public, plus good transportation service. The attitude and action of employees toward the public may be everything desired, but if the services of the railroad are not good in every way, then public opinion is going to be bad. By the same token, the services of the railroad may be excellent in every respect, but if the attitude and action of the employees toward the public are bad, then bad public relations are inevitable."

Mr. Porter recited the chain of contacts of a passenger with railroad and pullman employees from the ticket office to the end of the trip. If all the employees are courteous, friendly and helpful, the passenger has a kindly feeling toward the road; that is good public relations. But the discourtesy of a single employee in the chain of contacts will destroy the effect of the good conduct of all the others; this creates bad public relations.

"There are some other aspects which enter into the creation of good or bad public relations," he said, "Passengers want to travel in clean, well-kept equipment. It is important, therefore, that the toilets and washrooms in the coaches and Pullmans be kept clean. Unless they are, bad public relations are inevitable.

"Another important factor in the creation of good public relations is the matter of handling passenger trains. People instinctively resent rough handling. And especially is this true at night when passengers are asleep. If their rest is disturbed by rough handling, they are going to complain about it, and that is bad public relations."

Mr. Porter stressed the importance of all in positions of leadership demonstrating by their own practice that they believe in the importance of such personal characteristics as kindness, thoughtfulness and courtesy. "Our attitude and our actions toward the public and toward our fellow workers," he said, "actually are shaped by the little things we do from day to day as we go about our work. These little things in our lives become habits which, in turn, shape and mould our personalities and our characters. Thus, they are far more important than we realize because they are the things which make us good or poor leaders, which lift us up or hold us down, and which play such an important part in the shaping of good or bad public and employee relations."

Supervisor's Responsibility in Safety

R. P. Hamilton, superintendent safety, St. Louis-San Francisco, addressed the meeting on the subject of the supervisor's responsibility in promoting safety. He spoke in part as follows.

I don't know of any more effective way of selling safety to railroad employees than through their supervisors. Unless the supervisor is so permeated with safety ideas that he is enthused with that subject his employees will never catch the safety spirit.

Loyalty works from the top downward, never from the bottom upward. If a supervisor expects to get loyalty from his employees, he must first be loyal to them. So it is with safety. We, as supervisors, must display a genuine interest in safety so as to instill into our employees an abiding safety complex. We cannot become enthused about safety today and forget it tomorrow and expect to get the results that we should have. The supervisor must himself be a good example of how a man should perform his work safely. He must also be the type of man who is a good leader so that his employees will willingly and gladly follow his advice; most men actually work for the "boss" and not for the company.

What It Takes to Teach Safety

Here is a formula for the success of a supervisor in teaching safety to employees: (1) to study; (2) to live it; (3) to teach.

Before we can teach others, we must know how to teach. But studying after leaving school or college has become a lost art. Too few are preparing for the job ahead, so as to be ready for it when the opening occurs. Frequently, when promotions are made, men who were passed by wonder why they were not promoted. Preparation must come first.

The supervisor has a responsibility to study and prepare himself to be a good safety leader. He should read safety literature and study matters pertaining to his particular field. He should learn the best method of effective approach to employees to get their fullest cooperation and the best results from each. He is a salesman selling safety.

Emerson wrote, "What you are speaks so loudly I can't hear what you are saying." The most effective way to convince others that we are sincere is that we live what we preach. I once saw this happen in a large steel mill. A sign in the engine room read, "Positively No Smoking. Aanyone violating this rule will be discharged." One of the bosses entered the room smoking a cigar and the engineer in charge pointed to the sign and said, "There are a number of fire hazards in this room. I would appreciate your not smoking in here." The boss shouted: "Don't tell me what to do. I don't take orders here, I'm the one who gives them." I might add that when the "big boss" learned of the incident a change was made and the man who thought he was too big to obey the rules was no longer connected with the company.

You can't build loyalty on such a basis. Unless men see in their supervisors an inward loyalty to the management's regulations, they will soon regard most of them as an outward display and treat all rules and regulations accordingly.

More and more the supervisor's task is teaching. The day of driving men is past. Most men will respond to good leadership and to sound, clear-cut, well-meant advice. If the supervisor has studied to prepare himself for his task in safety matters and is himself a true convert to the cause the teaching becomes easy. The fact that he knows and lives safety gives him the necessary prestige with his men. Personal contact, especially if the workman is made to feel that the supervisor has a personal interest in him, will not fail to get results.

The Reward

What is the reward for the supervisor who measures up to his task as a safety specialist? In most other activities the results can be plainly seen. We cannot say definitely what a supervisor accomplishes because of his efforts in safety, but we know if he will earnestly prepare himself by studying safety and living it and doing his best to instruct his employees, he will have a satisfaction that few other phases of his work can offer.

Efficient Use of Locomotive Coal

In a paper on the availability and efficiency of the steam locomotive, C. R. Patterson, regional locomotive fuel supervisor, Canadian National, reviewed the parts played by the back shop and enginehouse, water treatment and improvements in the locomotive, particularly as to the front end and air distribution, in improving the efficiency and increasing the availability of the steam locomotive. He told of savings effected by the purchase of prepared coal. These included a reduction of about four per cent in the coal used, the elimination of steam failures and substantial savings in labor at the ash pit and in coaling-plant operation. He cited a reduction in the fines produced by crushing between the tender and the distributor plate from 25 per cent to 10 per cent by changing from the BK stoker to the HT stoker.

In speaking of the road foreman's responsibility for supervision of engine crews, he said that in the instances where these officers have been placed under the jurisdiction of the division superintendents rather than the superintendent of motive power, they are assigned to investigations which take their time away from their supervisory duties to the detriment of the service.

Prevention of Rough Handling

W. T. Rice, general superintendent, Richmond, Fredericksburg & Potomac, presented a paper on the prevention of loss and damage and personal injuries due to rough handling, of which the following is an abstract.

The subject of loss and damage has become of great importance as one of the controlling features in the cost of railroad operation. Vast sums of money are being paid yearly because of damaged freight, and dissatisfied shippers seek other methods of transportation for future shipments.

Personal injuries are being fought on all sides by railroad management because they not only result in personal suffering to the injured person and his family but frequently cause the loss of the services of a skilled employee who cannot be replaced in a short time.

The responsibilities of the men in the engine cab in our program to reduce damage both to property and individuals are many. Once a train starts moving from a terminal the movement is controlled by the engineman and many times, during the course of the train's travel from terminal to terminal, the efficiency of the man in the engineman's seat will determine whether or not his company will make a profit on that particular train.

In the first instance, a man to be promoted to an engineman must be thoroughly familiar with the physical characteristics of the portion of the railroad over which he will operate. This, coupled with a knowledge of the practical characteristics of slack action will enable him to control the throttle of his engine consistent with the grades and dips that will minimize the slack adjustment throughout the train.

The engineman must be thoroughly qualified on air brakes and realize the necessity of smooth stops that will not create a dangerous condition on any portion of the train. This is particularly true when handling passenger equipment. We must face the fact that certain passengers ride our trains with the full realization that any unusual handling will enable them to bring suit against the railroad claiming personal injury.

Much has been said concerning rough handling of freight equipment in yards and terminals. However, we must not lose sight of the fact that severe damage occurs to the freight we haul on the road. This damage is usually the test of the efficiency of the man who is handling the train.

The transition from steam to diesel was accompanied with an increase in train length and an entirely different type of operation in starting the train. Many of us recall the accompanying broken knuckles, pulled drawheads, and other failures that were a part of this transttion. These failures, however, became less as the men in the diesel became more familiar with the operation of the new power. The success of the diesel is largely due to the manner in which men in your position train operating crews.

An engineman is not only the lookout man for his own train, but can serve his company well by noting the irregularities or equipment failures all along the railroad. Such observation often reveals hot boxes, shifted ladings, fires, track and bridge irregularities and live stock on the track.

The full compliance with state, local and company instructions concerning crossings at grade or where operating through city streets can be of great assistance in preventing accidents. The keen observation of road crossings and approaching vehicles is extremely important as the first witness in any crossing accident is the engineman of the train, and usually his testimony is the controlling feature in placing the responsibility. The warning of track gangs by use of engine whistle when they are apparently slow clearing the track and report of such instances to the superintendent can prevent a horrible calamity.

The engineman also plays an all important part in loss and damage in yard switching. His action on signals given from the ground and the manner in which he controls his independent brake valve can frequently determine whether we will deliver a car on time to a satisfied customer or pay a claim to a disgruntled ex-customer.

In the final analysis, the instruction under which engineman works and the degree of efficiency is a direct result of the degree of efficiency of the road foreman or traveling engineman. I cannot impress upon you too strongly the necessity of continued instruction to your engineman along lines that will increase his interest in promoting the smooth, safe and efficient handling of all trains, both freight and passenger.

Education of Diesel Road Men

F. M. Roberts, road foreman of engines, St. Louis-Southwestern, in a paper on the education of road supervisors and engine crews, described the system followed on the road by which he is employed. This began with two weeks' instruction in the builder's school before diesel locomotives were delivered, followed by builder's instructor to accompany and instruct the road foreman after the locomotives went into service. The road foreman operated a locomotive until approved as an engineman by the instructor. He then instructed enginemen and received instructions concerning the fireman's duties. After full approval by the instructor, the road foreman also instructed the firemen. The builder's instructor continued to ride with the road foreman for some time, assisting him when trouble developed, but all instruction of the crews was done by the road foreman. Each road foreman must study the operating manual so that all road foremen give enginemen the same instructions. Enginemen must also read manual.

A new fireman is given 60 questions which he must answer within 60 days to remain in the service. After passing examinations on them he receives another set on which he is examined in a year. He is examined on a third set after two years' service. If he passes this examination he receives a final set of questions on which he is examined for promotion. Each road man is furnished an operating manual and a trouble-shooting pamphlet which he must carry while on duty. Firemen are required to make four or more and enginemen six or more trips over a division, accompanied by a road foreman or a qualified fireman or engineman, before being qualified to go out by himself. He has three copies of a letter on which are listed the subjects on which he must be informed before being qualified. Each road foreman signs for each item on which he has given instruction, and the last one to ride with him reviews the entire list. When he is qualified the engineman sends one copy of his letter to the superintendent of motive power, one to the engine dispatcher and keeps one.

During the first qualifying trip every effort is made to put the engineman at his ease. Instruction follows the order in which the crew is expected to proceed in checking all supplies and apparatus, including the position of all controls in the rear cab, and going on with starting and putting engines on the line, draining the air system, and checking the ground relay, over-speed trip, starting contactors, reset button on the governor, ammeters, control air pressure, auxiliary generator switch, and lube oil pressure on each unit and the P.C. switch on the operating unit. These items, failure to check which causes about 85 per cent of all delays, are printed on the cab door as a reminder.

Before the locomotive is moved the engineman, in his seat, is shown the operation of the throttle, reverse and transition levers, the brakes, sanders, etc. He is instructed in the procedure should

his foot come off the safety control pedal. Then the road foreman takes over the locomotive and handles it for the first half of the trip, demonstrating the various train-handling procedures. In controlling the speed of the train, the procedure to suit each track condition is demonstrated, including the use of the dynamic brake, the train brake and the independent brake.

After the engineman appears relaxed, usually about half way over the division, he takes over the operation of the locomotive, under the guidance of the road foreman. On subsequent trips, more thorough instruction is given, starting from the beginning and following through in a definite sequence, which is helpful in trouble shooting. The sequence is: (1) fuel pump must operate, (2) fuel oil must show in the sight glass, (3) engine must turn over, (4) engine must fire, (5) lube oil pressure must be normal, (6) engine must speed up, (7) locomotive must move, (8) each engine must carry its load, and (9) temperature must be normal. This combines operation with trouble shooting.

The single unit is the basis of instruction and it is broken down into systems, such as the fuel system, cooling system, etc. Then each system is broken down into parts and the road foreman explains what it is, where it is and what it does (the three W's). Safety precautions are emphasized.

In trouble shooting, the importance of not getting excited when something goes wrong is emphasized. Another point is to recall the last thing done before the trouble developed; the trouble will probably be associated with that. In locating trouble where an electrical circuit is involved it is better to trace the circuit back from the defective part than to start at the source of current and trace through to the defective part. Both men are shown how to make out work reports. Delays caused by diesel failures are reported to the master mechanic, the superintendent of diesel equipment, and the road foreman of engines. The case is described in a bulletin which states whether proper procedure was followed and, if not, states what should have been done. No names are mentioned in these bulletins.

The report opposes the creation of surprise defects and cautioned against impatience in dealing with the men while they are learning. For those who want to know still more about the locomotive the various circuits are traced in different colors on the wiring diagram. Every effort is made to answer the questions of the men fully. If the curiosity of the engineman who is interested in his job is not satisfied by the instruction which he receives he will tinker with the apparatus to get the answer. If it is true that "we are a product of our environment," then diesel enginemen will be only as good as they have been taught.

Water Treatment

The paper, by B. W. DeGeer, engineer water service and fuel facilities, Great Northern, briefly reviewed the three methods of water treatment developed for use in conditioning feed water for steam locomotives. These are external treatment, which requires high expenditure for tanks, pumps and chemicals; the Zeolite system, which also requires expensive plant and chemicals; the wayside or internal type, in which the chemicals are introduced into the wayside water tank or directly to the water column as water is being taken. He also explained the use of lignins and tannins which are used with the inorganic material to (1) prevent scale and corrosion in feed lines and heaters, (2) condition the sludge, or suspended solids, in boilers to prevent scale formation, (3) stop corrosion and pitting of boiler metal, and (4) assist in preventing embrittlement stacking of boiler sheets. The extensive use of organics has made the wayside method of treatment the most widely used.

The reduction of the number of steam locomotives in service has caused the abandonment of many external treating plants which have been replaced by wayside treatment. In a few cases all treating plants have been abandoned and a composite treatment in ball form, which is added to the tender, substituted. Unfortunately, however, there has been a general letdown in maintenance of injectors, boiler checks and heaters, in proper cooldown and thorough washing, and in boiler water testing and supervision of water treatment.

Diesel Cooling Water

Raw or improperly conditioned water in the diesel cooling system caused much trouble from scale, rust and sludge interfering with heat transfer and from corrosion of the various metals in the cooling system. There are as many as ten metals, besides carbon and synthetic rubber in contact with the water. Each pair of metals in contact is a potential source of galvanic corrosion. There are frequently other forms of metal attack such as crevice corrosion, cavitation and fatigue corrosion.

To overcome all the troubles mentioned, water-treatment chemicals must be low in price, stable readily soluble, and effective with all kinds of water against all types of corrosion and scale forming materials, All of the chemicals failed in one way or another except the chromate type now in general use.

Not only must the chromate content be up to specification, but the pH also must be maintained between 8.5 and 9.5. If water is absolutely pure it will be what we call neutral, neither acid or alkaline, and we say it has a pH of seven. If the pH is less than seven, we say the water is on the acid side and acids attack metals like iron and steel. Weak acids like vinegar or citric acid have a pH of about three. On the other side of the picture, if we add a little soda ash or caustic soda to water, the pH will rise above seven. The higher the pH is above seven, the more alkaline the water is. Chromate treated waters in the pH range between 8.5 and 9.5 provide maximum metal protection.

The pH of the water is stabilized and adjusted by the use of chemicals called buffers. If buffers are not used the pH may vary enough to cause trouble with aluminum, brass and solder if it gets too high and attack iron and steel if it gets too low.

Continuity of treatment is most essential and it is important that chromate concentrations be maintained at all times by additional treatment as necessary. Treatment is added frequently, often daily. This is necessary because of leaks at cylinder-head gaskets, liner seals, and loss of water and chemicals through tank overflow. The latter is frequently caused by condensation of steam piped to the radiator to prevent freezing on layovers, and from overfilling.

Every diesel terminal should have testing equipment and a routine check system installed. Treatment should be added immediately when tests indicate the need. It should be emphasized that the best treatment in the world is useless unless it is in the right place in the right amount, not part but all of the time.

At the meeting of the American Safety Congress last summer I had the pleasure of discussing chromate dermatitis, or skin trouble, with Dr. Louis P. Schwartz, the foremost dermatologist in the United States. Dr. Schwartz said that railroad employees handle many products far more dangerous than chromates such as lye, acids and cleaning compounds, as well as many detergent oils, etc. The only precaution he recommends is ordinary personal cleanliness. Wear gloves and other protective clothing when handling the dry product and launder as frequently as necessary.

Most workers are unaffected by chromates unless they are extremely careless in regard to personal hygiene. A few others are allergic to chromates and should be assigned to other work.

Diesel Steam Generators

Steam generators as used on Diesel locomotives are called upon to perform an almost impossible task. In a very limited space, they must produce up to 4500 lb. of steam per hour, with pressures up to 275 psi and once started, must operate automatically. Two types of steam generators are in general use, and unfortunately water conditioning dosages, blowdown schedules, etc. which give good results with one type may have to be modified somewhat to give best results in the other.

Both types of steam generators have been successfully operated with many different types of water conditioning. These include demineralized water with pH correction, lime-soda treated water with organics added, internal treatment with calcined potassium carbonate, internal treatment with alkaline carbonates, tannins and phosphate, Zeolite treated water with pH correction and tannin, etc. In general, heaver chemical dosages are used for the Vapor-Clarkson steam generators with total alkalinity running up to 50 per cent of the total dissolved solids, and blowdown is adjusted to control sludge rather than dissolved solids when internal treatment is used. Alkalinity between 25 per cent and 30 per cent of the total disolved solids is recommended for the Elesco units, and blowdown is adjusted to hold the dissolved solids sufficiently low to prevent carryover and to give satisfactory sludge condition in the generator.

Regardless of the type of water conditioning used, careful and

continuous supervision by qualified personnel is necessary if best results are to be obtained.

Smoke Abatement

In a report on smoke abatement in Washington, D. C., by a committee of which M. G. Stewart, road foreman of engines, Washington Terminal was the chairman, the procedures were described by which violations of the city smoke ordinance are investigated and measures developed to prevent their recurrence. The following table was presented showing the trend away from steam and toward the diesel in the Washington terminal.

LOCOMOTIVES IN AND OUT OF WASHINGTON, JULY 1936 AND JUNE 1952

	July 1936	July 1943	January 1952	June 1952
Steam in	2,592	3,431	704	506
Steam out	2,592	3,431	704	506
Diesel in	134	465	1,516	1,585
Diesel out	134	465	1,516	1,585
Motors in	1,062	2,032	1,640	1,502
Motors out	1,062	2,032	1,640	1,502
Yard:				
Diesel	....	4	25	25
Steam	21	31	3	3

Mr. Stewart referred to a portable air jet device which has proved effective in the enginehouse and dispatch yard for elimination of smoke when building fires in the locomotive. He also had blueprints of a smoke-washing device which greatly reduces smoke and fly ash while locomotives are being serviced on the fire track.

Safety Precautions on Diesel Locomotives

The report on safety precautions on diesel locomotives was prepared by a committee of which R. D. Nicholson, road foreman of engines, New York, New Haven & Hartford, was chairman. It listed the various safety devices on diesel locomotives for protection of the equipment and set forth a number of operating rules designed to prevent personal injuries. These specified dead circuits before checking electrical apparatus, stopping the locomotive before reversing, having power off the line before cutting-in or cutting-out traction motors, shutting down the power plant affected in case of grounds, short circuits or flashovers, shutting down an engine in event of unusual sounds or actions or if excessive vapor comes from the breather pipe, caution when wearing rubbers on metal engine-room floors, and caution against being thrown off balance when moving through the engine room while the locomotive is in motion.

Other precautions listed include keeping out of high-voltage cabinets and touching nothing in them unless the engine is stopped, and seeing that the particular low-voltage circuit is dead before removing a fuse for testing or renewal. Precautions against crank-case explosions are set forth in detail.

Operating instructions include keeping engine-room doors closed to avoid drawing dust into the engine room. Train brakes should be fully released before starting or the locomotive may drag the train and cause damage. Power should be applied carefully until all slack is taken up. Do not have control or fuel-pump switches on in both cabs at the same time when changing ends. Differences in auxiliary generator voltages on the two units may cause a heavy equalizing current through the fuel-pump or control wiring. The dynamic brake should be applied gradually and the locomotive brake should be kept off in case an automatic brake application is made while the dynamic brake is applied.

Do not block in contactors or relays in order to get power. Do not block open the engine fuel rack in case of a governor failure. If the throttle should be closed to "idle" the diesel engine will be unloaded with full fuel on and will run away.

Fires are usually of electrical origin. The first indication is the smell of burning insulation. Stop the train if the fire is found to be under the floor or in a traction motor. When taking charge of the locomotive make sure no rags or other materials are lying around, particularly in electrical cabinets. Watch for fuel-oil leakage. Here odor is an indication.

Among operating precautions which may be taken during preparatory time are care to see that all hose are coupled and cocks properly opened between the units after they have been separated for servicing or repair. When starting, if the engine does not fire within 10 seconds, check for something wrong; do not deplete the battery. After starting, note that the starting contactors are not stuck. The routine check of oil and water levels, pressures and temperatures before leaving the termimal may forestall trouble on the road. Know that all engines respond to power when the throttle is moved one or two notches and that all hand brakes are released before moving. Do not move the throttle above the fifth notch to speed up engines for increased compressor output when the locomotive is standing.

Locked Wheels

A defective or overheated traction motor armature bearing is apt to lock the wheels. Slid flat wheels may result in damage to rails and possibly in derailment. At station stops where time permits a member of the engine crew should inspect trucks and familiarize himself with normal temperatures of bearings. if an armature bearing is found to be heating enroute, reduce speed and remove the load by shutting down or idling the power plant driving motor. Set out the defective unit if it cannot be operated to a relief point. A locked wheel can sometimes be freed for low-speed movement by moving the locomotive back and forth. Otherwise it can only be freed by burning off the motor pinion or the drive gear on the axle, but only for restricted movement.

A heated traction-motor axle support bearing should receive additional oil and packing if necessary. Remove load from the bearing by moving the engine-control switch to "idle". The train may then move, observing the bearing frequently. When an engine is isolated by placing the engine control switch in "idle" position the wheel-slip indicator for the motors driven by that power plant is also inoperative, and extra care must be taken to observe the bearings enroute.

Train Delays Due to Diesel Failures

A report by a committee of which T. J. Conway, fuel supervisor, Texas & Pacific, was the chairman, described a number of failures involving governors, load-regulators, lube-oil-pressure protective devices, fuel pumps and temperature control devices. Governors, the report said, must have the proper oil level. Low or high oil level will cause the engine to hunt and may cause it to be shut down and sound the low-pressure alarm. The remedy is to correct the governor oil level.

Slow governor response because of too heavy oil causes difficulty in transitions between No. 2 and No. 3, both up and down. The remedy is to use lighter oil.

Follow instructions with respect to starting an engine after a governor safety-control shut-down. Failure to do so in a case where the engine shut-down was caused by a hot connecting-rod bearing, led to throwing of the connecting rod.

On E.M.D. GP-7 locomotives which have a "teaser" circuit for switching there is a L.R.S. switch in the load-regulator housing. Sometimes this fails to operate, hanging in mid-position and depriving the generator of excitation. Tapping on the housing or moving the switch by hand will save an engine failure.

The low lube-oil-pressure protection device on Alco-GE locomotives consists of two pressure-operated switches. One reduces the engine to "idle" at a certain pressure drop and engine speed; the other shuts the engine down if the pressure drops low enough. If the first switch opens, a failure may be saved by turning the engine control knob to Run 4 position. If there is an actual loss of lube-oil pressure the engine crew cannot correct it on the road.

Most fuel-pump troubles are beyond correction by the engine crew. However, if the pump stops, check for a loose cable connection at the pump motor. If this is the cause, it is readily

remedied. Fuel pumps sometimes stop because the drive shaft coupling becomes loose.

Tighten the Coupling Set Screw

Failure of temperature-control devices should seldom cause delays. Practically all diesel locomotives have arrangements for operating the shutters and controlling the cooling fans manually. The temperature-control circuit on E.M.D. F-3 locomotives comes from and is protected by the fuel-pump motor circuit. A blown pump-motor fuse was caused by a faulty a.c. contactor. This could have been isolated by tripping the a.c. contactor overload reset button on one contactor at a time until the faulty one had been found, with the loss of no more than four fuses. In this case the blown fuse was repeatedly replaced until all 10-amp. and 15-amp. fuses on the locomotive had been used up, with the loss of the unit.

The report listed a number of operations performed by the engineman which can cause damage if they are improperly performed. These are essentially the same as those listed in the report on improper handling of diesel locomotives.

Aiding the Crew to Locate Trouble

As crews have become familiar with diesel locomotives, delays caused by blown fuses and tripped circuit breakers have become less frequent. The committee suggests that crews can be assisted by properly identifying each starting contactor, ground relay and battery-charging ammeter and by stenciling a list of such apparatus on the door of each cabinet in which it is housed. Other suggestions involve a relay alarm bell circuit which warns of a tripped circuit breaker on a battery-charging circuit, and the raising of ground-relay actuation to 500 miliamps by connecting sufficient resistance in parallel with the relay coil. This has improved reduced unnecessary functioning during snow storms and heavy rains.

The report closes with a summary of the more frequent types of equipment failures examples of which are contained in a list of 71 cases of failure or delay attached to the report. These are control jumper failures, stuck braking and power contactors, and interlocks in control circuits out of line or dirty.

Improper Handling of Diesel Locomotives

A committee, of which R. R. Rich, road foreman of equipment, Chicago, Rock Island & Pacific, was chairman, presented a list of steps in the operation of diesel locomotives, from starting the engines to stopping the train, which are frequently mishandled by enginemen.

Starting the Engines

When starting a cold engine the test cocks should be opened; if there are none, listen carefully for unusual sounds and release the starter button immediately if they occur. Hold the lay shaft in no-fuel position for a few turns. Starting with water in the cylinders will cause serious damage. Let the fuel pump run a few seconds before starting the engine, but not long, which might cause fuel to leak into the cylinders, resulting in loss of lubrication, premature ignition and dilution of lubricant in the crank case. If engine does not fire within 10 or 15 seconds release the starter button and check to see that necessary switches are all closed and that no fuses are blown in the fuel circuit. Do not use the starting button to inch the engine over; the points will arc and pit. Do not start two engines from the same circuit at the same time. This will result in a blown fuse.

In early diesel locomotives the low-oil-pressure alarm is inoperative unless the isolation switch is in the run position. Do not leave the engine until the oil pressure has built up at least to the minimum. Cooling-water level should be rechecked after the engine has been running a few minutes; there may be an air lock in the system. Permit engine to idle long enough to build up air pressure to 70 lb. Power contactors will not close and brakes will not operate without air pressure. Temperature should reach 125 deg. F. before operating the locomotive. Oil-operated controls will not respond to cold oil.

Starting the Train

In charging the brake system of a train the throttle should be operated in the lowest notch which will maintain a main-reservoir pressure between 110 and 130 lb., in no case above the third notch.

If the train does not start in the high throttle notch, reduce the throttle to Number One notch and pause there long enough to permit the engine brakes to be applied to prevent back lash of gears when the throttle is moved to Idle. This also prevents heavy arcing when the power contactors are opened. When pumping air with the generator field switch open, on some locomotives the load regulators will assume a position corresponding to the throttle position. After reducing the throttle, closing the generator field switch and placing the reverse lever in a running position, sufficient time must be allowed for the load regulators to return to minimum field before advancing the throttle; otherwise the locomotive will move with a surge of power which may damage draft gears. This will also happen if the field switch is closed when the reverse lever is in position and the throttle open.

Bad Practices on the Road

Do not use sand while the wheels are slipping. This is a common cause for the failure of traction-motor pinions and axle gears. Excessive use of sand contributes to the accumulation of dust in traction motors, leading to high-voltage grounds and generator flashovers. Operate the transition lever strictly in accordance with the transition meter. This is particularly important when speed is reducing on up grades. Reduce the throttle on all diesel locomotives before passing over a railroad crossing. Time this so the load control will be operating in minimum field as the wheels cross. Do not stop trains with the throttle open. Close it at least 100 ft. before the stop, make a final brake-pipe reduction and allow the engine brakes to apply. This will prevent the rebound of the locomotive and back lash of the gears. Do not exceed specified speed limits and thus avoid overspeed damage to the motor armatures.

While the locomotive is in operation it is important to maintain a uniform engine temperature. The ideal is 165 deg. F. This may be varied by plus or minus 15 deg.

In yard service reversers are sometimes mishandled. The reverse lever should never be changed until the locomotive has come to rest. There have been cases where enginemen in local service make flying switches by opening the generator field switch to unload the engine with the throttle in fifth or sixth notch and later closing the switch without closing the throttle. This produces a heavy electrical load and will, no doubt, lead to trouble.

Train Handling

This report, which was prepared by a committee of which T. H. Bickerstaff, general supervisor air brakes, A. T. & S. F., was chairman, covered the entire range of train handling, including the manipulation of the throttle of diesel-electric locomotives, the braking of trains and the stopping of trains, both passenger and freight.

The instructions for starting passenger trains apply to E.M.D. EA7 or E8 locomotives and emphasize the importance of pausing about three seconds between throttle positions as the throttle is advanced or reduced and, in closing the throttle before taking slack, to hold it on No. 1 position long enough to let the amperes on load meter reduce to 200 before moving to idle.

In braking or stopping passenger trains, initial brake-pipe reductions are 8 lb. After the exhaust ceases the throttle is moved to No. 1 position. If speed is to be reduced to below 30 m.p.h. it should be moved to "idle" position. For stops from high speed, reduce the throttle to No. 3 position, make an 8-lb. brake-pipe reduction, close the throttle to idle and make the further reductions necessary to reduce speed to 12 to 15 m.p.h. when 400 or 500 ft. from the stopping point. Complete the stop by making a graduated release. For each graduation brake-pipe pressure should be raised not less than 4 lb. Graduations should cease when brake-pipe pressure has been restored to within 10 lb. of standard. Avoid the necessity of making a reapplication; this will produce a rough stop.

Dynamic Braking of Passenger Trains

When dynamic braking is to be used close the throttle to idle and hold the transition lever in No. 1 position for at least 10 seconds before moving to "off" position. Then move to "B" for 5 seconds and then to maximum braking. On long grades apply the train brakes with light reductions until the desired retardation has been produced, starting with maximum dynamic braking. When a speed reduction of 15 m.p.h. or more is to be made on level or light grades start with an initial brake-pipe reduction. When the exhaust port has closed apply the dynamic brake and make further brake-pipe reductions if necessary. If retarding force is still needed on releasing the train brakes, move the transition lever to "B" position, release the train brakes with light graduations, allow time for the slack to close, and increase the dynamic brake as needed. When stopping do not use the dynamic brake below 15 m.p.h. Move transition lever gradually to No. 1 position and stop with the train brake after slack has adjusted.

Electro-Pneumatic Brakes

The report sets forth five outstanding advantages of electro-pneumatic brake operation as compared with automatic brake operation. These are (1) the brakes on all cars and locomotives are applied simultaneously; (2) full service is obtained on the entire train in from 2 to 4 seconds; (3) brake-cylinder pressure can be graduated up or down at will; (4) on mountain grades the brakes can be cycled on and off without using retainers because the brake pipe and reservoirs are charged at all times; (5) brake-shoe wear is reduced at least 30 per cent as compared with the automatic brake. Some form of antiwheel-slip is necessary to insure reasonable freedom from wheel sliding when high cylinder pressures are used. Sanding equipment has also been found desirable to restore slippery rail to near dry-rail condition.

The most prevalent defect has been failure of a train-line circuit due to grounds or broken wires. Open circuits are generally caused by defective or loose connectors between cars.

In the discussion of handling passenger trains the question of taking slack in starting passenger trains was raised. The practice on the Seaboard was described. With trains of 800 to 1,000 tons on level track, the locomotive is reversed and the slack taken for a few cars and the train stopped without applying the brakes. Then the train is moved ahead. Spotting passenger trains at station platforms where the train is much longer than the platform requires a slow approach. Two roads whose practices were described in the discussion release the brakes a few seconds before the last application, then depend upon a single blast of the signal whistle from a trainman for the final application to spot the train. To make a smooth stop the signal is given on one of these roads about three car lengths before the spot at which the stop is desired. Another road drags the train into the station at slow speed with a light brake application and stops merely by closing the throttle. A question was raised as to whether the prerelease of brakes just before the train comes to a stop is good practice with trains of more than 12 cars. The Seaboard prereleases successfully with trains of 18 cars and more on the level part of the line. At the northern part of the line such trains are stopped with about 10 lb. pressure in the brake cylinders.

Starting Freight Trains

After the brake valve has been placed in release position allow from two minutes with trains of 60 to 80 cars to six minutes for trains of over 140 cars. It is seldom necessary to take slack to start a freight train with a diesel locomotive. Place the transition lever in No. 4 position with automatic transition and in No. 1 position with manual transition. Open the throttle to the position necessary to start the train, holding in each position about two seconds. Use sand continuously. If starting with two locomotives, allow the first locomotive to nearly stall before aiding with the second. After the locomotive starts keep the train just moving until the slack is all out, then advance the throttle as required.

Stopping Freight Trains

The initial brake-pipe reduction on freight trains should be 6 lb. After slack is adjusted make further reductions, the total to be not less than 15 lb. for trains up to 80 cars and 20 lb. for trains from 80 to 125 cars. On mountain grades where retainers are used special instructions apply. The brake-pipe exhaust should be open when the train stops. Do not release train brakes (a) when forward part of train is descending and rear is ascending or on level track; (b) when rear part is on curves; (c) when loaded cars are near the front and empties at the rear, and (d) when brake-pipe leakage is excessive.

If the train is stopped by a service application from the rear while the dynamic brake is applied, when the engineman sees the brake-pipe flow indicating light or feels the train dragging he should prevent the locomotive brake from applying. When the speed is reduced to 10 m.p.h. he should apply the locomotive brake to 10 lb. cylinder pressure and move the transition lever to No. 1 position.

Mountain Grade Braking

In mountain grade braking one of the first and most important considerations is conditioning of the cars in the train for the descent of the grade. This includes a test to determine that air brakes operate properly during service applications, to determine existing piston travel and make necessary adjustments, to determine leakage in the system, to determine that retaining valves and related piping are efficient and that brake shoes are of sufficient thickness to withstand the work required and the heat they will be required to dissipate in controlling train speed.

There is also the necessity for certain rules and special instructions regarding the use of retaining valves on descending grades. This varies considerably with the per cent of grade, length of grade, proportion of loads and empties in the train, whether loads are light or heavy, and on the type of motive power used. Speed on the grade must be low enough that heavy applications will not be necessary to control speed, and that the pressure retained in the cylinders will control the speed while recharging the system. Before beginning the descent of heavy mountain grades, the brakes must be applied and released to see that they are operative throughout the train. If the train must stand for some time after this test, it must be repeated to insure that an angle cock has not been turned or the brake pipe frozen in severe winter weather.

In winter weather the brakes should be applied soon after starting and while working steam or power to free the brake shoes of frost, snow or ice before the entire train enters on the descending grade. Keep the speed low so that a brake application will not be necessary before the greater portion of the train is on the descending grade.

The short cycle method of braking has been found to be the most successful on grades where retaining valves are used. This method results in the maintenance of uniform speeds and auxiliary reservoirs can be kept charged to near maximum pressure, and braking power and wheel temperatures are uniformly distributed.

The locomotive brakes and hand brakes if necessary must be used to hold a train when stopped on a heavy grade, thereby permitting the release of the train brakes and recharging the brake system. If the locomotive is to be detached from the train the air brakes should be released, then, beginning at the lower end of the section to be left standing, enough hand brakes should be set to hold the train. After recoupling, the brake system must be recharged before the hand brakes are released.

If a train should part on a heavy descending grade, hand brakes should immediately be set on all sections of the train before closing the angle cock on the portion attached to the locomotive. Then the air brakes may be released and the system recharged. After recoupling, the brake system must be recharged before the hand brakes are released.

During the discussion of freight train handling a question was raised as to how to use the transition levers on a two-unit locomotive one unit of which has manual transition and one, automatic transition. To get transition throughout the locomtive, transition would have to be operated with the transition lever.

Exception was taken to taking one foot of slack, as suggested in the report, say on a 150-car train, as being hardly worth considering. One speaker said that if slack is to be taken it ought all to be taken. It was pointed out that the locomotive has sufficient traction to start almost any train, but the question is whether the draw bars would stand that kind of a start. With the slack taken and starting the train one car at a time it would be impossible to pull a drawbar. Another speaker opposed taking slack back to the caboose. If the caboose moves that is a backup movement, of which the crew has no warning. This speaker advo-

cated setting the brakes while the train is still standing, then reverse the locomotive, place the brake valve in position to release the brakes at the head end, open the throttle and shove the slack back (one car length will take the slack of 50 or 55 cars) but not to the caboose. Then set the locomotive brakes, release the train brakes, set the reverse lever in forward position, start the sanders and increase the throttle progressively.

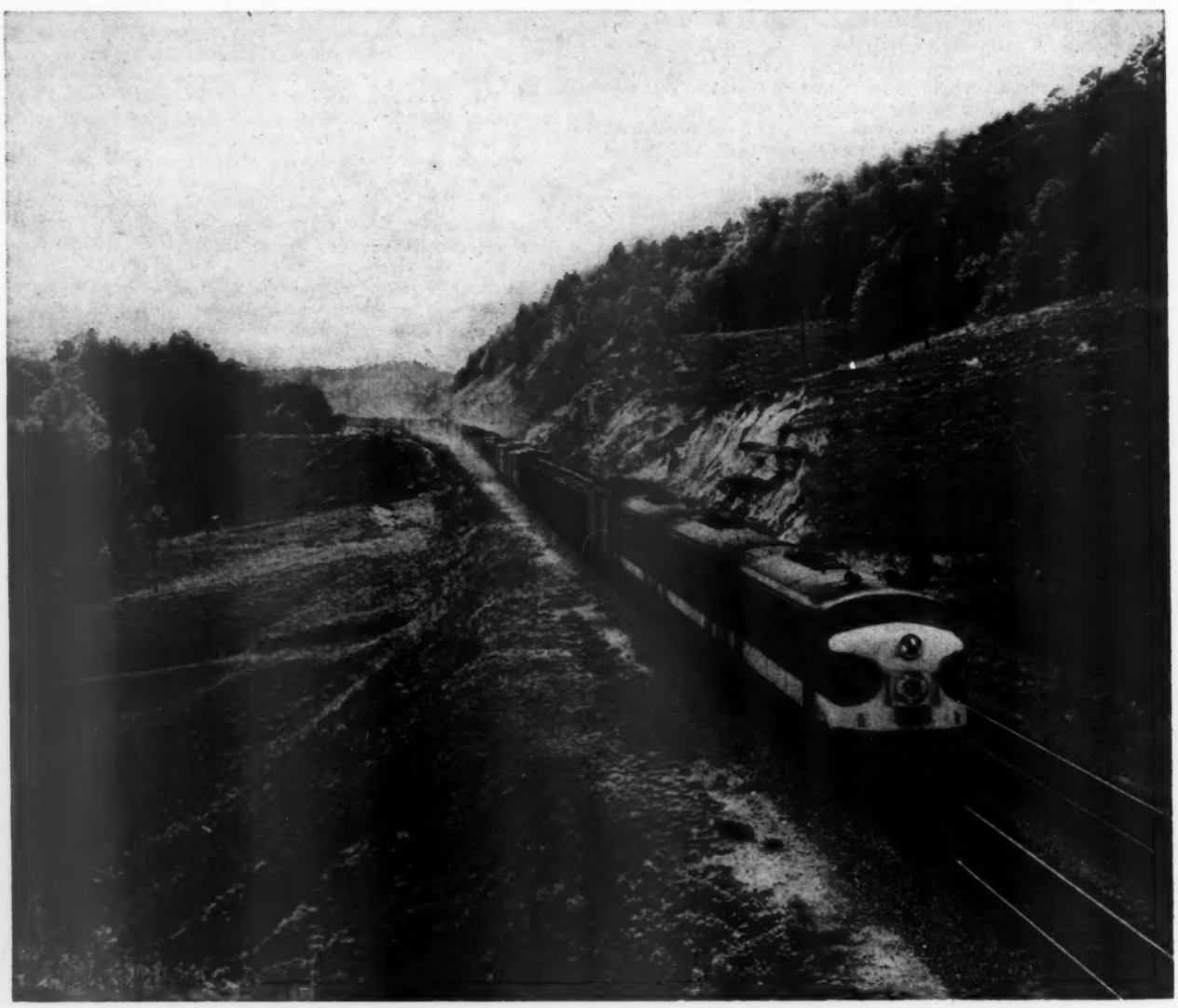
Allowing six minutes for release of brakes before starting a freight train and keeping a train moving slowly for three car lengths were both questioned from the floor. The time, it was said, might be too long or it might be too short, depending on the length of the train. With respect to the second point, the members were reminded that some roads are handling up to 190-car trains.

In the discussion on stopping freight trains, it was pointed out that prohibiting the release of the brakes at speeds below 10 m.p.h. is the rule on one road, but that the limit is 20 m.p.h. on another, 30 m.p.h. on another, and 35 m.p.h. on still another, and that the rate of retardation determines how low the safe speed may go. One speaker warned that in developing rules for the use of the dynamic brake on grades it should be remembered that it can fail, and that contingency should be covered in the rules.

In considering whether stops should be made with the slack stretched or bunched, one road makes no attempt to stretch a train of over 75 cars. On longer trains the brake-pipe gradient is such as to cause, first, a run in of slack, followed by a slight run out. Six conditions were named which have to be favorable if stretching can be done effectively. They are (1) the majority of the loads should be in front; (2) piston travel should be uniform; (3) the brake-pipe gradient should be within 3 lb.; (4) brake applications from front to rear should not take over 5 seconds; (5) the speed should not be over 25 m.p.h., and (6) the profile should be favorable.

Undesired emergencies are occurring with AB brakes. The question was asked what could be done, after an undesired emergency had occurred when a first-service reduction was being made, to avoid a repetition when the next brake application had to be made. One road finds that to let the brakes apply by brake-pipe leakage will usually avoid a repetition.

In commenting on the minimum reduction of 12 to 15 lb. advocated in the report, one speaker said that the release-insuring valve of the AB brake prevents the brakes sticking no matter what the engineman does, but another questioned depending on this valve to permit lighter reductions because many brakes have been in service for nearly 36 months.



Diesel Maintenance Holds Attention of L.M.O.A.

S. M. Houston,
First Vice-Pres.
(Assistant general superintendent motive power, Southern Pacific)

H. H. Magill,
(Superintendent motive power, C. & N. W.)

F. D. Sineath,
Second Vice-Pres.
(Assistant general superintendent motive power, A. C. L.)

Addresses, reports and discussions indicate that railroads are now trying to perform a big electrical maintenance job with too few facilities and inadequately trained personnel

ONCE again the Locomotive Maintenance Officers' Association led in registrations and attendance at the Chicago meetings, indictating an interest on the part of mechanical men in discussions and reports that will simplify their maintenance and servicing problems, whether it be in terminal or general repair shop. H. H. Magill, superintendent motive power, C&NW, presided at the opening session each day and introduced the chairmen of the several sessions. The L.M.O.A. program for the three-day meeting embodied reports on personnel training, shop tools, diesel engine oil leaks, crankshaft and bearing failures, a report on wheel slip, an electrical committee report on the causes of flashovers, a report on reclamation and the control of materials and a report of a committee on the determination of diesel facilities for small, medium and large roads. The latter report appeared in the

T. T. Blickle,
Third Vice-Pres.
(Mechanical superintendent Coast Lines, A. T. & S. F.)

J. T. Daley,
Fourth Vice-Pres.
(Superintendent motive power, Alton & Southern)

C. M. Lipscomb,
Sec.-Treas.
(Assistant to schedule supervisor, M. P.)

October issue of *Railway Mechanical & Electrical Engineer* (page 77) and the report on flashovers and their causes also appeared in last month's issue (page 87). All other reports except wheel slip, reclamation of diesel parts, diesel locomotive cleaning and a paper on Improving the Performance of Steam Locomotives, which appeared in the *Railway Age* for September 29, 1952, page 51, are abstracted along with the discussion, if any, in this issue.

The association was addressed by W. J. Patterson, member of the Interstate Commerce Commission and by Edward H. Davidson, director of the Bureau of Locomotive Inspection, I. C. C. Abstracts of these addresses appear elsewhere in this issue.

President Magill, in his opening remarks, paid tribute to the many members who, by their work during the year, contributed to the success of the meeting and in conclusion said, in part:

"This meeting presents the greatest challenge and opportunity we have ever had for service to the industry. With the ever increasing number of diesel units being placed in service, thousands of apprentices, mechanics and supervisors remain to be trained; our men continue to injure themselves or each other, oil leaks, crankshafts and bearings fail, material costs continue to climb, and at the same time, valuable and expensive and much needed motive power is held out of service for comparatively insignificant repair parts, diesel tools need to be standardized, secured, kept and cared for, diesel locomotives and the parts need to be cleaned and kept clean, steam locomotives need to be maintained and utilized to fullest efficiency until replaced by diesel power, diesel facilities need to be built to save money today and tomorrow, diesel wheels continue to slip with enormous damage to the equipment and interruption to service, team work in safety, performance production and a program of planned conservation of materials through reclamation is needed now as never before and last but by no means the least problem, traction motors and main generators continue to flash, contributing greatly to our maintenance costs and interrupting our service."

The officers elected to serve during the coming year appear in a list shown on page 122 of this issue.

How To Stop Oil Leaks

Oil leaks came in with the first diesel-electric locomotive. While fuel oil leaks have been troublesome, the main concern is lube oil leaks.

Every railroad has several types of power, some of which are worse offenders than others. The leaks accumulate and spread over the floor creating a hazard for anyone working in or passing through the engine room. On occasion the oil seeps through the floor onto the running gear and finds its way into electrical junction boxes and terminal strips, causing various kinds of electrical disturbance and deterioration of insulation. Some roads have even built dams around the engine by welding strips to the floor. This confines the oil and keeps it off the passageways but does not correct the leaks. One road found it necessary to hire additional help to clean the engine room at specified service points enroute to prevent the accumulation of oil. These leaks have also increased the labor and time involved in the cleaning of the trucks and underframe at final terminals.

Leaks on small covers and inspection plates are sometimes the result of improper application, but more often short gasket life is at fault. While it is a small job to renew gaskets on many of the inspection covers, it is on those covers which are removed periodically that improved materials are needed. We ordinarily think of an inspection cover gasket as a trivial item of expense, but records of one road alone show an issue of 64,000 in one 12-month period, representing $10,240 at $.16 each on just one type of gasket.

The smaller gaskets can be readily renewed but those leaks which occur between the crankcase and oil pan and housings at both ends of the engine are costly and to repair properly, requires complete engine rebuild. Progress has been made by applying additional and higher tensile strength cap screws and improved gaskets. This modification involves templates and redrilling of the block and housing which, of course, is better done at time of heavy repairs or major overhaul period. Some roads are also sealing the joints on the outside and those engines having had this treatment are leak-free at the reworked joints. This procedure enables shop forces to correct the more costly leaks without dismantling the engine but requires about 48 out-of-service hours per engine. Each joint is properly calked and cleaned, then two coats of a special primer are applied with one hour drying time allowed for each coat. The special sealing compound is then applied with a 1 in. by .010 in. fiberglass tape placed over the joint and between the two coats of sealing compound. This entire application is then allowed to dry for at least 36 hours. The results of this method have been encouraging.

Additional cap screws will better equalize the various flange loading and permit greater torque values resulting in tighter joints, less movement of the flange surfaces, and longer gasket life. Another remedy for the leak between oil pan and crankcase consists of a machined groove running the full length of the oil pan on each side into which a silicone cord is placed. The cord is compressed and forms an oil seal at this joint.

A design change made on Type 567C engine, not yet in production, is the top deck and cover change which affords a better seal at the cover. The top deck cover is now hinged to the back of the top deck frame and carries a Neoprene seal against the flat surface of the frame when the cover is closed and latched. This design has also reduced the number of gasketed joints at the generator end, which, of course, will reduce the oil leaks at that end of the engine.

While external oil leaks have been stressed, some thought should be given to internal oil leaks. Leaks of this nature are mostly invisible and, in many instances, their presence is not known until damage has been done. These are often caused by breakage of rigid lines brought about by expansion and contraction within the engine and vibration. The early Type 567 engine with the rigid oil lines in the gear train needed continual repairs until the manufacturer developed the slip joint oil line. Only after flexible lines were applied between fuel oil manifold and pump could breakage and fuel leaks at this point be stopped on the Type 244B engine. Where possible, flexible lines should be employed where vibration is present and alignment difficult.

The above is an abstract of a report made by a committee of which J. W. Luke, general supervisor of diesel engines, AT&SF, was chairman.

Discussion

With reference to building dams around engine base to prevent oil from running out into the passageway one road reported that while it had done this the ICC inspectors did not look upon this as a satisfactory solution. Another member raised the question as to the availability of plastic or liquid gasket compound which would resist detergents used in lube oil. A committee member pointed out that compounds should not be relied upon to stop leaks entirely but that the gasket and the companion surface are the important factors in leak prevention. One builder's representative mentioned the use of crankcase vacuum in one series of engine which has been found to minimize oil leaks. Another speaker, however, said that an improper amount of vacuum in the crankcase might easily give rise to dangerous conditions.

Crankshaft and Bearing Failures

Crankshaft and bearing failures are so closely related that it is seldom we have one without the other. Any consideration of change of one involves the other; in fact, the two are generally considered as a unit

Changes in operating conditions and increased horsepower demand presents continual problems with bearings and crankshafts. As one requirement is met, another is introduced in the continual quest of more horsepower per engine. While these required changes are primarily design changes and the manufacturer's responsibility, the railroads are receiving more and more different types of equipment which require a never-ending stream of parts and material—few of which are interchangeable. This, in turn, increases the chances of mistakes by the mechanics in the shops as well as the amount of stock which must be carried at any one point. We realize these changes, some of which are improvements, are natural progress which the railroads would never deny but the ultimate goal of every manufacturer should be interchangeability of component parts on the

many different locomotives being sold to the railroads today.

Lubricating oil is also closely related to the crankshaft and bearings and cannot be ignored in any discussion of these failures. Any change in the engine horsepower causing an increase in bearing load must have an oil of sufficient film strength to maintain adequate lubrication between the bearing surfaces. With the changes in the many lubricating oils to the present day additive and non-additive greater strength oils, we have a problem of emulsification with water which has changed our entire maintenance setup. Because we do have water leaks into the lubricating oil and because this water mixes with the oil to form an emulsion, we have had numerous crankshaft failures. With improved materials, engines, and lubricating oils, water in the lube oil is indeed a headache. We have had to set up elaborate checks at strategic points to determine the presence of water in lube oil. It is apparent that if the railroads are to be denied a lubricating oil not susceptible to water they must have engines free of water leaks.

Crankshaft losses are sometimes the result of piston, liner, or connecting rod failures. Rrecently, one road was testing cast iron pistons as a replacement for aluminum pistons and subsequent failure damaged the crankshaft beyond further use. In an obvious effort to hold the weight of the cast iron piston close to the weight of the aluminum piston, the design resulted in structural weakness which allowed the piston to be pulled in two when seizure occurred. The tin plating on the piston walls peeled off and closed the pores in the liner which also contributed to the seizure. In cases where a piston has broken allowing the upper end of the rod to whip around inside the engine and those cases of broken connecting rods, either the engine block or crankcase, or both, are severely damaged.

From time to time, bearings are often changed because of material shortages and again because new materials or methods have been developed which, on test, appear to be superior to the bearings already in use. The changes oftentimes make a favorable showing under test in the laboratory but when placed in actual railroad operation, failures develop which heretofore had not been considered. As bearing changes or any design and material changes are made, it is felt the laboratory tests are not of sufficient duration or the conditions under which the tests are conducted do not approximate actual railroad operating conditions. Too many times a new product or change is introduced and heralded as a major improvement only to fall short of the manufacturer's claim after it is adopted by the railroads.

During the test stage of any new development, that part of the equipment under test should be made to operate in snow, ice, sand, dust, and every conceivable combination of conditions which are encountered in actual railroad operation. Too often the proving ground is a clean, air-conditioned building where the equipment is protected from the elements.

Each new bearing generally bears a new part number, particularly where a new vendor is involved. This adds to the confusion in the various shops and store departments where we are faced with hundreds of these number changes each year. The net result is loss of valuable man hours in proper identification and, in some cases, improper bearings are placed in an engine. These bearings should be properly and easily identified and where more than one number is involved, that both numbers be carried on the bearing with the latest number also identified. Many man hours have been lost because a certain bearing, with a new number, has been delivered to the shop and they have been unable to identify or determine which bearing has been superseded.

If the bearing troubles do level off and we can relax for a moment, notice is suddenly received that all bearing of a certain series, made between certain dates or having certain characteristics, are subject to failure and should be removed from all engines and storehouse stock immediately. Once again we start through the engines to remove all bearings that fall in that category. Each time a bearing is disturbed, the human element enters and chances for failure are increased. It is difficult to keep experienced men versed in all bearing applications on this types of work and therefore, improper application or the use of a faulty bearing is a possibility. It has always been the contention that the less handling and the least number of inspections during the life of any bearing is most desirable. Other roads, no doubt, have had experience in that an engine performed satisfactorily until some inspection or work was performed on the engine and thereafter trouble was immediately encountered.

The service of each bearing and experience teaches what inspections are necessary and what life to expect from the bearing While credit should be given where credit is due in the development of improved bearings, the railroads have certainly been the guinea pigs in the major portion of these developments.

The last of the large manufacturers has now changed from a hand fitted to a precision-type bearing. This change involved the use of a bearing with no shims between the halves but required accurate and permanent shims applied between cap and bed plate. With our modern operation with high availability, hand fitted bearings are not desirable. Bearings which can be replaced by merely rolling one out, rolling another in, and retightening the cap with no adjustment of shims, are most acceptable to all roads. Having the upper and lower bearing halves interchangeable is another advantage.

The lead babbitt, aluminum, and the tri-metal bearings are the most common but tri-metal, due to its increased cost, need not be used where the bearing load does not justify the harder and more expensive bearing; namely, switch power. A gridded bearing was tried on two type of power prior to the acceptance of the trimetal bearing, but failures occurred on this bearing soon after their application. Those bearings in the road power were immediately removed but it was found we could get a year's service out of this bearing in our switch power. Although the use of the bearing was discontinued, those already on hand are being used in certain specified engines for one year only, after which time they are removed and scrapped. The few switch engines now using this bearing have the large capacity lube oil pump as the greater running clearance of this bearing demands a greater oil supply.

We insist on steel-back bearings for all engines where available for greater resistance to closure as our experience with the bronze-back bearing has been none too favorable. By far, those bearings rejected during an inspection period have not been for wear but for shelling and flaking. Any signs of bearing metal in the crankcase or on the oil filters, prompts an immediate bearing inspection. What we have considered for years as poor bond between the metal in bearings has, in many cases, now been shown to be oil corrosion. Facts and tests have definitely proved that some oils are much more corrosive than others to the lead in present day bearings. As a simple test, 10 gr. of granular lead and 300 gr. of test oil were placed in a beaker and heated to 225 deg. F. for 40 hours. The oil was then poured off and the lead washed and weighed, from which the weight loss was calculated. Of the four oils tested, there was no loss in weight in two cases, but with the other two oils, there was a 20 milligram loss with one and an 8 milligram loss with the other. From this and other similar tests, it certainly seems an investigation by the oil companies is indeed warranted.

An entirely new field of faulty bearing detection has now been opened by the use of the spectrograph. This instrument, while a common tool to the metallurgist and the laboratory scientist, is but about a year old in its application to oil analysis of the diesel engine. Those roads which have this instrument feel it has a place in diesel engine maintenance. The high initial cost, together with the operational cost, has made many view this procedure with skepticism. However, there has been case after case where spectrographic analysis has detected trouble in the engine 30, and even 60 days, in advance of the failure. At the present time, it appears that a standardization of procedure is needed if the results of one operator are to match those of another. As more experience is gained, both in the operation of the spectrograph and the interpretation of the results, a standard of operation for all makes of diesel engines may be set up from which future maintenance can be based.

Crankshaft Misalignment

Misalignment of the shaft has never been too great a problem although trouble was experienced with two or three new engines continually wiping out the mains because of misalignment of shaft. These cases were soon corrected by the manufacturer and no further trouble was experienced. Generally speaking, the engine A-frames have been reinforced on all engines to the point where bed distortion has been kept to a minimum. However, as the engines become older and where welding has been done adjacent to the bearing supports, the question of alignment again

arises. There are also opinions that any engine after three or four years of service is subject to misalignment due to temperature cycles as there is a tendency for the metal to grow. If this condition does exist, it appears engines should be rebored after about five years of service to insure crankshaft alignment and full bearing life. This, of course, will require a thorough investigation. Once a main bearing fails and excessive heat is involved, the main bearing fit closes which necessitates the line boring of the entire block. This is expensive and on those roads not equipped to do this work, means the crankcase must be returned to the manufacturer for reboring.

Crankcase bearing supports are rebored in our shops at San Bernardino with very good success. Some supports are welded where necessary and the boring bar of our own design is used for this work.

Crankshafts have been made with as large main and crankpin journals as feasible to obtain the utmost in rigidity and to reduce the overall bearing load as much as possible. Experience has indicated that engines containing drop-forged, dynamically balanced crankshafts of low alloy carbon steel and induction hardened main and crankpin journals have given the best service. There has been little wear on these journals and the bearing life has been very good. One value of the hardening process was demonstrated quite clearly on those engines involved in the flood last year at Kansas City. The shafts which had been hardened were not affected by the corrosive action of the flood waters while those shafts not hardened were pitted at the journal surface. The hard journal surface further protects the shaft in some cases of bearing failure where the initial bearing surface has wiped out leaving the harder metal in contact with the journals. In fact, we have had a few cases where this took place and the bearing reseated itself with no damage to the crankshaft.

A recent change by one manufacturer to increase their horsepower rating was the enlarged diameter of main and crankpin journals. This new shaft requires thin main bearings and thin flangeless con rod bearings. Bearing trouble has already developed on this engine and the manufacturer and the oil companies are not in agreement as to the cause. It would seem that this case bears out my former statement that these changes are not subjected to the proper test before introduction to the railroad.

It is customary to reclaim crankshafts after they have been scored or overheated by grinding to an undersize providing no heat checks are present. We make no effort to reclaim any shaft which contains heat or thermal cracks. All crankpins are ground to the same undersize as are the main journals although both mains and crankpins need not necessarily be ground to the same size. We have a shaft in service which was repaired by the sleeve and hard chrome plating method and its performance is being followed closely. This particular shaft had previously been ground to undersize and the No. 4 throw was badly damaged. By normal standards, this shaft would have been scrapped; but by the sleeve and plating method, the damaged throw was first turned to remove all scoring and the sleeve applied. The chrome plating was then applied to give the desired hardness and the throw ground to match the remaining throws. We have another shaft in service from an eight-cylinder engine which was replated by the same method and returned to standard size. This has been in service eighteen months and is still giving good service. While the plating method has been used quite extensively, there are limitations at the present time to the plating thickness that can be applied to any one surface.

It has not been possible to establish a reasonable life on all types of bearings as some cannot be relied upon to give one year's service. However, it is the intention to set a life expectancy with a reasonable safety factor and at the end of that time, all bearings will be renewed. This will eliminate disturbing bearings for routine inspection as well as any controversy over whether the bearing is fit for further service and for how long. This procedure will use less bearings, eliminate guess-work in the inspection of bearings, and remove the human element of misapplication.

This report was presented by a committee of which J. W. Luke, general supervisor of diesel engines, AT&SF, was chairman.

Discussion

Considerable discussion took place after the presentation of the subject, most of which had to do with shop methods for the detection of worn shafts and bearings and the proper method of re-alignment during engine overhaul. It was obvious that many members are of the opinion that engine design has much to do with this type of failure and that unsatisfactory lubricating oils also are a major factor. Discussion of spectrographic analysis indicated no wide difference of opinion as to its value though the cost was questioned. A member, however, brought out that one road had brought the cost of this type of inspection down to an average of $50 per year per unit.

One builder's representative attributed much of the crankshaft troubles not so much to improper design in the engine as to misalignment in engines damaged in wrecks and the same speaker disposed of the lube oil problem by saying that as long as the railroads appear to need different types of oils for different engines it is a problem with which they must contend; that his company had established specifications for lube oil that function satisfactorily with engines built by his company and indicated that compromises in "specs" relating to oil lead to difficulty.

Shop Tools for Diesel Work

The subject, Standardization, Control and Distribution of Tools for Diesel Work, made up a report of a committee under the chairmanship of F. E. Molloy, assistant superintendent motive power, Southern Pacific, which consisted of two parts: one having to do with a list of basic tools needed at small running repair terminals and in general repair shops for machinists, electricians and sheet metal workers; the other a presentation of several devices developed by different roads for performing diesel repair operations. Of the latter group several are shown here with a description of their use.

Fig. 1 shows a piston Magnaflux table approximately 18 in. wide by 5 ft. long with a Micarta top. It provides for the inspection of the top of the piston, of the outside surface and of the inside of the piston.

The top of the piston can be Magnafluxed by placing the piston upright in the rectangular coil which is 10½ in. wide and 16 in. long. It is made up of three turns of 3/32 in. by 1 in. copper. The coil is 234 cm. per ampere. The coil is mounted on end so that the inner surface of the bottom is 1½ in. below the surface of the table. The arch form is at right angles to the table top.

The inspection of the outside surface of the piston is accomplished by laying the piston on its side and revolving it inside of an 11 in. diameter coil of 3/32 in. by 1 in. copper, three turns. This coil is also mounted at right angles to the table top and the bottom of the coil is about 1½ in. below the surface of the table top.

The interior of the piston is inspected by turning the piston upside down on a mesh electrode and inserting a prod electrode inside of the piston. The mesh electrode is made of three layers of copper screen No. 28 wire cloth, 50 mesh. It is approximately 10 in. in diameter and rests on ½ in. felt pad, which in turn rests on a base of Micarta. The three pieces of copper mesh are laid between two copper bus bars.

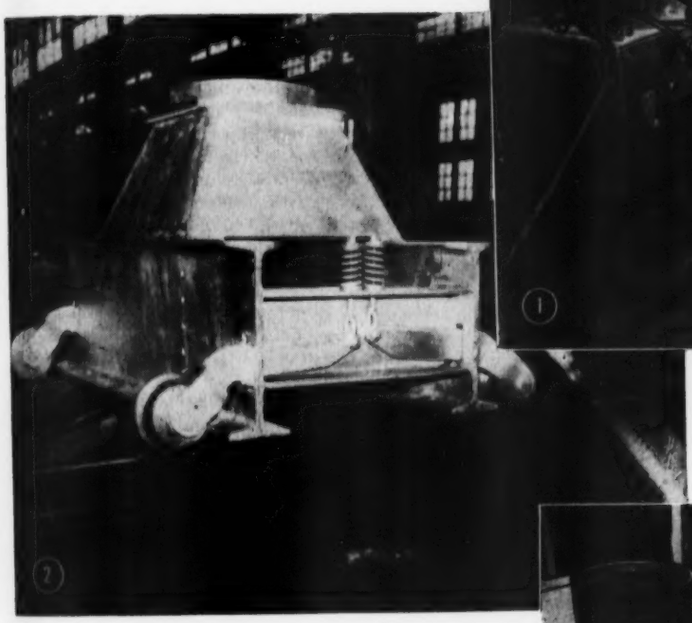
A conventional Magnaflux power unit provides the power required to magnetize the pistons for these three methods.

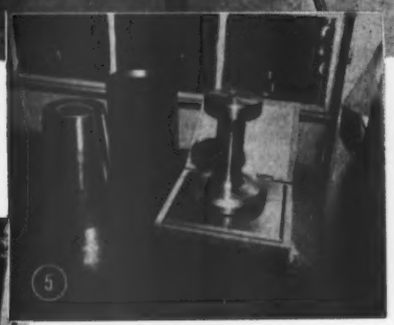
The two coils take about 500 amp. while the copper mesh and prod electrode use 2,000 amp., therefore, it is necessary to place a choke coil in series with both the rectangular and circular coils to limit the current. The choke coil is made of nine turns of No. 2-0 wire. The current to the mesh electrode must be turned off when the piston is placed on the electrode so as not to draw an arc. A Magnaflux inspection gun completes the necessary equipment.

Fig. 2 shows a pedestal support for locomotive body which is one of a pair of pedestals used to support a locomotive when the trucks are removed. The pedestal carries the weight of the locomotive in its natural position on the center bearing and is of the proper height for checking clearance, pilot height, etc. Suspending a locomotive on these pedestals allows the alignment of engine or main generator without having a twist in the frame. The clevis mounted wheels with special tension allow for easy movement on the rails for lining up with the center casting or moving from one location to another. As the weight of the locomo-

1—Special table for making Magnaflux inspection of pistons.

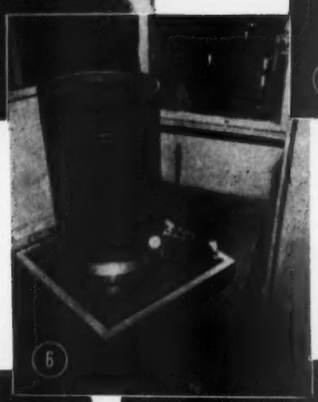
2—Pedestal for supporting locomotive when trucks are removed.



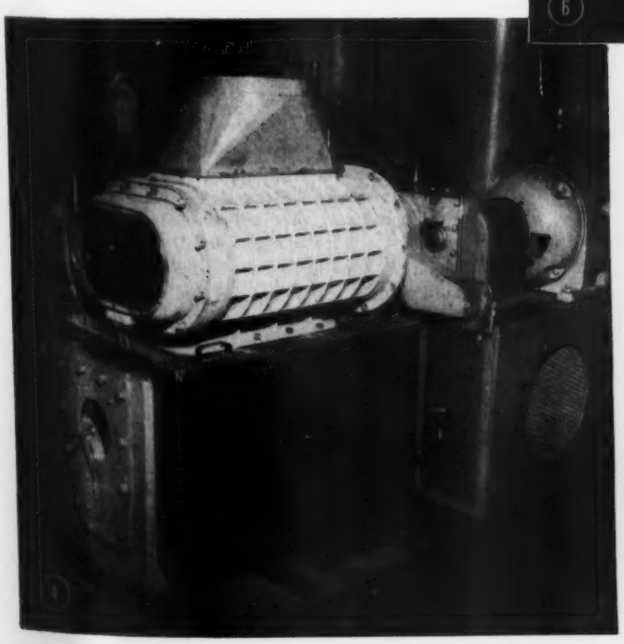


3—Rack for assembling piston and rod sets.

4—Test rack for checking condition of engine blowers.



5 and 6—Stand with mandrel for checking concentricity of pistons.



tive is set on the pedestal, the heavy I beams move down in contact with the rails.

The portable piston assembly rack shown in Fig. 3 was designed to hold an engine set of new or reconditioned piston and rod assemblies. Besides providing a fast and efficient means of transporting the assemblies from the assembly area to the engine, its use promotes cleanliness and good workmanship because the material to be installed is stored in a neat and orderly manner.

The test rack for engine blowers (Fig. 4) consists of an electric drive, oil pressure pump and tank and pressure measuring device. It can be used to check condition of blowers removed from engines at regular maintenance periods and to run in and test reconditioned blowers.

The piston checking stand (Figs. 5 and 6) consists of a heavy steel base plate upon which a mandrel, machined to fit the inside finished surfaces of the piston, can be revolved. A piston to be checked is placed on the mandrel and a dial indicator attached to a surface gauge is used to check the concentricity of the piston. When not in use a steel cover is placed over the mandrel to protect it from damage.

The concluding part of the report was a discussion of the value of systematic methods for checking and distributing tools to workmen in shops and terminals.

How Apprentices Should Be Trained

Before entering into a discussion of apprentice training we should first consider the necessity of a paper on apprentice training, because apprenticeship is not something new.

This paper deals primarily with the crafts that diesel power has affected, namely the Machinist and Electricians.

Need For Preservation

It is the recommendation of the Committee that apprentice training continue under shop management having direct supervision over the apprentice, because the training must be associated with the training procedures over which supervision is directly responsible. Apprentice training should not be subjected to any exploits, or experiments, but rather all that is necessary is that our present methods be altered to suit the need that has been brought about with the advent of diesel power.

Apprenticeships must be recognized as arts. To fix these arts in the minds of individuals, a well defined objective must first be established in the mind of the apprentice to be trained. The true values of apprenticeship can only be appreciated when the individual trained is able to evaluate the knowledge, or experience, progressively followed, which has been set up in a fundamental sequence, by a self analysis of his experiences which have instilled into him the ability to perform the work of the craft in which he has been trained.

The apprentices on the American railroads today will be the mechanics of tomorrow. The efficiency of industry will be reflected in the type of craftsmanship produced by the trained employee. Anything that would disturb the apprentice, brought about by unrest, or failure to recognize the valuable fundamentals to his training will only result in his failure.

Apprentice training must be recognized as designed to produce finished mechanics; industry needs skilled mechanics, and the individual needs to be trained. There is a common interest between the railroads and the crafts in the investment by the railroad industry in producing a skilled mechanic. There also should be a desire on the part of the individual to be properly trained to the end that an apprentice training system effectiveness will be reflected in a well trained mechanic.

Management cannot receive the services of a skilled mechanic unless the mechanic has been properly trained. The individual, or apprentice, cannot associate himself with an art without the necessary qualifications, and these qualifications can only be obtained through proper training. From these fundamental principles industry has progressed to what it is today.

It would take but a moment to see where we must apply a principle that will instill the basic fundamentals of training. The responsibility of management is to set up a procedure of teaching that will produce a trained mechanic. It is likewise true that the apprentice, when employed, after due process of screening and until the probation period is complete, has confirmed that the individual possess the necessary qualifications of aptitudes to apply himself to the arts of the trade, which will, if these factors are kept in the minds of management and the apprentice, result in a finished mechanic.

Training System

EMPLOYMENT

1. Careful Screening of all applicants
   (a) Education—Employing officer should be satisfied that the applicant's education is equivalent to the trade requirements. In most cases it would seem that a High School Education would be the minimum.
   (b) Tests—I.Q. test to determine mechanical aptitude.

(If screening method discloses the applicant suitable, a brief explanation should be made to the Applicant what his particular craft offers. This is considered very important. The Organization or Management of the apprentice system that he will soon enter should be thoroughly explained. It should also be explained to him what is meant by a probationary period, which is designed to prove his attitude as well as his aptitude, and that such a period is necessary to both he and the Management, since if the applicant should be allowed to continue as an apprentice when he does not have the right attitude or aptitude, it will result in an injustice to both parties.)

2. Probationary period—Should be well defined. Six months would be the recommended minimum.
   (a) Graded—to determine all angles relating to the responsibility of Management to the Apprentice, as well as the Apprentice to the Management. Such grades, if properly made will determine the industry of the individual as well as his attitudes and aptitudes.
   (Individual railroads should set up their standard grades that will pass or reject an apprentice.)
   (b) Placed with the best of mechanics. (Apprentices to be given a fair probationary period should be placed with the best mechanics. Apprentice instructors and supervisors should be diligent to apprentices in this probationary period.)
   (c) Meetings of supervisors and instructors in charge of Apprentices. (These meetings should be held periodically to discuss the progress of apprentices in order that the probationary period will be made effective and protect both the Apprentice and Management.

TRAINING DETAILS

1. On the job training
   (a) Work with mechanics and/or under the direct supervision of supervisor or instructor.

2. Classroom instructions
   (a) Classroom instructions should be sufficient to train the apprentice in mathematics, mechanical drawing, blue print reading, and free hand sketching.
      (1) Mathematics
      Exercise problems to check his mathematical aptitude on problems that are peculiar to the training for which he has been employed.
      (2) Mechanical drawing
      A minimum to teach him the rudiments of this subject in order he can correctly identify mechanical details reflected in blue prints, etc.
      (3) Blue print reading
      Sufficient lessons to check his knowledge of the subject.
      (4) Free hand sketching
      Considered to be highly important to be able to visualize and to illustrate ideas to expedite with handling, stimulate accuracy, and a means to transmit detail.

3. Reference Library—Wherever possible should be provided (Apprentices should be encouraged in supplementary education in connection with their apprenticeship, such as correspondence schools.)

The outline set up below is only a suggested outline, and the time periods on the various work procedures, set up as experience factors to teach the apprentice, by doing, will have to be fitted to the particular railroad's condition, while the outline furnished is designed to place an estimate on what will be required as fundamental to the apprentice's training periods.

Care should be exercised in starting the apprentice on the elementary phase of his training and schedules made up respecting the sequence from the elementary to the advanced. The outline we are submitting is a recommended time that should be spent on the various jobs in order that the above might be accomplished.

MACHINIST APPRENTICE TRAINING SCHEDULE

Unit Number	Unit	Time, hr.
1.	*Diesel Truck Repairs:*	520
	a. Renewing wheels and traction motors	
	b. Traction motor repairs	
	c. Renewing wearing plates, springs & hangers	
	d. Brake rigging repairs	
	e. Truck frame	
	f. Welding, 50 hours	
	g. Machine work, 60 hours	
2.	*Tool Room:*	520
	a. Repairs to small tools	
	b. Lathe work	
	c. Milling machine	
	d. Grinding machine	
3.	*Diesel Parts Reconditioning:*	1,040
	a. Cylinder heads and valves	
	b. Cylinder liners, regrinding	
	c. Pistons, pins and rings	
	d. Connecting rods	
	e. Governor	
	f. Pumps, lube oil, water and fuel	
	g. Injectors and pumps	
	h. Blowers	
	i. Turbo-chargers	
	j. Machine work, 180 hours	
4.	*Machine Maintenance:*	1,040
	a. Steam derrick	
	b. Locomotive cranes	
	c. Stationary boilers	
	d. Coal handling equipment	
	e. Pumps	
	f. Maintenance of way equipment	
	g. Welding, 150 hours	
	h. Machine work, 180 hours	
5.	*Steam Generator:*	520
	a. Running maintenance	
	b. I.C.C. requirements	
	c. Operating and testing	
6.	*Drafting Room:*	520
	a. Blue print files	
	b. Reading prints	
	c. Familiarization with engineering design problems and policies, board work	
	d. Free hand sketching	
7.	*Wheel Shop:*	520
	a. Car wheel mounting and dismounting	
	b. Diesel wheel mounting and dismounting	
	c. Wheel lathes	
	d. Axle lathes	
	e. Magnaflux machine	
	f. Grinding machine	
	g. Wheel press	
8.	*Air Room:*	520
	a. Repairs to all air brake equipment	
	b. All air appurtenances	
	c. Air compressor overhaul	
	d. Welding, 50 hours	
	e. Machine work, 60 hours	
9.	*Cab and Air Job:*	520
	a. Running maintenance air brake equipment	
	b. I.C.C. requirements	
	c. Running maintenance air appurtenances	
	d. Air compressor maintenance	
	e. Machine work 60 hours	
10.	*Automobile Repairs:*	520
	a. Automobiles	
	b. Trucks	
	c. Motor cars	
	d. Tractors	
	e. Bull-dozers	
	f. All gasoline engines, M of W tools and equipment	
	g. Welding, 100 hours	
	h. Machine work, 120 hours	

NOTE: This item included since repairs to automobiles on some railroads are performed by the Mechanical Department, on others it is done by other departments. If this work performed by other departments, then this time can be diverted to other phases.

11.	*Diesel Engine Over-haul:*	1,040
	a. Disassembly and assembly	
	b. Rocker arms	
	c. Cylinder heads	
	d. Injectors	
	e. Pistons and connecting rods	
	f. Cylinder liners	
	g. Main bearings	
	h. Crank shaft	
	i. Cam shaft and bearings	
	j. Water pumps	
	k. Lube oil pumps	
	l. Fuel pumps	
	m. Timing gears	
	n. Harmonic balancer	
	o. Governor	
	p. Governor control	
	q. Boring main bearing seats	
	r. Aligning crank shaft and main bearings	
	s. Aligning main generator and air compressor	
	t. Setting timing gears	
	u. Welding, 180 hours	
	v. Machine work, 200 hours	
	w. Portable machine, 60 hours	
12.	*General Running Repairs:*	1,040
	a. Inspections	
	b. I.C.C. requirements	
	c. Adjusting governor and speeds	
	d. Lubricating	
	e. Testing	
	f. Portable machines, 60 hours	

It will be noted in the above schedule that welding and machine tool operation has been entered under items 1, 2, 3, 4, 8, 9, 10, and 11. It may be desirable to set up separate units for these, but in most cases machine experience and welding experience, due to limitations of such work, will have to be acquired along with other experience, except with companies still maintaining steam power. If the latter is true, then separate subdivisions can be set up for machine tool work and welding.

ELECTRICIAN APPRENTICE TRAINING SCHEDULES

Unit Number	Unit	Time, hrs.
1.	*Coach Lighting and Air Condition (basic):*	1,040
	a. Coach lighting panel	
	b. Air condition panel	
	c. Current regulators	
	d. Voltage regulators	

e. Air condition relays, thermostats and magnet valves
f. Lighting circuits
g. Generators
h. Conduit
i. General wiring
j. Insulation testing

2. *Diesel Maintenance (basic)*: 1,560
a. Testing voltage values
b. Sequence tests
c. Clean, oil and adjust contactors, relays, regulators and interlocks
d. Traction motors
e. Brushes and spring tension
f. Main generators
g. Auxiliary generator, exciter
h. Blower motors
i. Accessory drive motors
j. Magnet valves
k. Thermal and pressure switches
l. Control drums
m. Insulation testing
n. Automatic transition
o. High potential testing
p. Load testing
q. Light circuits
r. Governors and controls

3. *Repair Bench:* 520
a. Magnet valves
b. Pneumatic contactors
c. Pressure switches
d. Relays
e. Brush holders
f. Accessory drive motors
g. Regulators
h. Testing and adjusting

4. *Drawing Room:* 520
a. Reading prints
b. Interpretation of symbols
c. Familiarization with engineering
d. Problems and policies (board work)
e. Free hand lay out
f. Proper use of various meters and testing equipment

5. *Diesel Maintenance (advanced)*: 1,560
a. Testing voltage values
b. Sequence tests
c. Clean, oil and adjust contactors, relays, regulators and interlocks
d. Traction motors
e. Brushes and spring tension
f. Main generators
g. Auxiliary generator, exciter
h. Blower motors
i. Accessory drive motors
j. Magnet valves
k. Thermal and pressure switches
l. Control drums

6. *Inside and Outside Wiring:* 1,040
a. Plant lighting circuits
b. Shop machine motors
c. Line switches
d. Motor control equipment
e. Pole and line work
f. Transformers
g. Flood lights
h. General outside lighting
i. Power circuits

7. *Coach lighting and Air Conditioning (advanced)*: 1,040
a. Coach lighting panel
b. Air condition panel
c. Current regulators
d. Voltage regulators
e. Air condition relays, thermostats and magnet valves
f. Lighting circuits
g. Generators
h. Conduit
i. General wiring
j. Insulation testing

8. *Storage Batteries:* 1,040
a. Charging
b. Handling
c. Voltage testing by cells
d. Hydrometer and temperature tests
e. Discharging for capacity test
f. Electrolite equalizing
g. Sealing cells

Upon completion of his time, every apprentice should be given a certificate of apprenticeship signed by the proper mechanical officer.

This report was presented by a committeee of which E. V. Myers, superintendent, motive power, St. L.-S.W., was chairman.

Diversified Program at 1952 Air Brake Meeting

K. E. Carey
President
(Assistant road foreman of engines, Long Island)

Besides two addresses, seven reports and a joint session with the traveling engineers, the meeting this year included a symposium on automatic freight car slack adjusters

JUST how far reaching have been the effects of dieselization becomes evident when its impact is noted on a department other than that concerned with motive power as such. That the changeover in the means of train propulsion has left its mark on the air brake man and created new problems for him can be seen from the subjects presented at this year's meeting of the Air Brake Association—the 44th since it was founded and the sixth as a member of the Coordinated Railroad Mechanical Associations.

Two of the papers dealt with leakage, an increasingly important subject with the longer trains pulled by diesel locomotives and the higher speeds at which they are pulled. Another paper that resulted from the growing prominence of diesel power was one prepared by a committee on standardization on diesel- and turbo-electric locomotives. This paper covered a wide range of standardization recommendations varying from grouping of air brake hoses to suggestions on the controlled emergency feature and the safety control feature.

Descriptions of equipments, their operation and advantages, were covered in papers on the brake cylinder release valve and on the release control retainer as a means for better braking. Maintenance papers covered the latest approved practices on the D-24 control valve and types B and F relay valves, and the procedures and the facilities for repairing and testing diesel locomotive air compressors.

The association also heard two addresses. One was delivered by G. W. Misner, commercial engineer, Westinghouse Air Brake Company, on the subject To Create by Association a Closer Interest of Air Brake Men. In his paper, Mr. Misner described the advantages of belonging to the Air Brake Association and of attending its meetings, and gave some good advice on how to make the most effective use of such membership and attendance.

The second address of the meeting was by J. W. Hawthorne, general superintendent motive power and equipment, ACL, who spoke on the need for air brake men and other supervisors to become better salesmen and to learn to communicate better their ideas for improvements to their management.

The Air Brake Association also attended the annual joint session with the Railway Fuel and Traveling Engineers to hear a paper on train handling. As in years past, this subject was followed by a lengthy but lively discussion by members of both groups. A symposium on automatic freight car slack adjusters brought the meeting to a close.

The Release Control Retainer As a Means for Better Braking

Slower release of brakes on the head cars of long heavy trains has been found to be advantageous, and has resulted in the slow direct exhaust position of the present standard Release Control Retainer. This provides a somewhat slower brake cylinder rate of release but still allows all brake cylinders to release completely and thus permits running releases without excessive change in slack. It further eliminates the need for manual operation of the retaining valves at intermediate points.

R. F. Thomas
First Vice-Pres.
(General air-brake inspector, C. P. R.)

C. V. Miller
Second Vice-Pres.
(General supervisor air brakes, N.Y.C. & St. L.)

L. Wilcox
Secretary-Treasurer

In the development tests in 1939, a short pipe nipple with a No. 65 drilled hole (.035 in. diameter) was placed in the exhaust port of the retaining valve on a certain number of the cars at the head end of the train. This choke combination, when set with the retainer in normal release position, provided a release from 50-lb. brake cylinder pressure to zero in approximately 135 seconds. Road tests were then run with train lengths up to 125 loaded coal cars exceeding 11,000 tons. The special exhaust fittings mentioned above were applied to the head 25 cars. The A.A.R. brake pipe leakage was from 2 to 3 lb. per minute on the trains tested, and service applications in the form of split reductions were made through a speed range of from 30 to 40 m.p.h. with running releases made at from 18 to 30 m.p.h.

This operation was found to be entirely satisfactory and eliminated the shock, due to the slack action, which was normally encountered. In all cases, the brakes were completely released at speeds of 10 to 20 m.p.h., thus permitting the reapplication of power and not requiring that the trains be stopped. No special brake equipment was required on the locomotive, except it was found necessary to hold from 20 to 30 p.s.i. brake cylinder pressure on the locomotive, in order to prevent undue run out of the locomotive and excessive shock at the head end of the train. It has since been found possible to further reduce the locomotive brake cylinder pressure and still not encounter excessive shocks.

The above tests accomplished several things. It became possible to make running releases where prior to these tests most brake applications initiated at speeds of approximately 25 m.p.h. and under had to be held on until the train came to a stop to prevent rough handling due to run-in and run-out of the slack which in many cases caused break-in-twos. The use of the slow direct blowdown of the car brakes on the head cars also materially reduced run-in and run-out of slack when the signals or road conditions changed so as to require a complete or final stop of the train after attempting a running release.

From the results of these tests, the four-position retaining valve was developed which included the slow direct exhaust position in addition to the standard retaining valve settings. This retaining alve is now called the release control retainer and was adopted in 1941 by the A.A.R. and made standard in 1946. In its present form, the direct exhaust position included a choke and flow passages designed to be equivalent to a No. 60 drilled hole to give a brake cylinder blowdown of 86 seconds from 50 lb. to 10 lb., or 138 seconds from 50 lb. to zero pressure. The release control retainer has been designed to include a separate pipe bracket with the AB valve type of strainer and with the chokes and check valves located ahead of the cock key to provide minimum maintenance. All of the standard retain-valve positions and functions are retained, thus avoiding any change of instruction to trainmen, except those necessary to govern the use of the new position itself.

What Slow Direct Exhaust Can Do

The extent to which the slow direct exhaust position can and is actually being used is not realized by many of us, except for those closely associated with definite braking problems and with the scheduling of long and heavy tonnage freight trains. Three major advantages of the release control retainer, and particularly the slow direct exhaust position, are:

1. The ability to handle long freight trains over much longer territories involving grades which previously required the setting up and turning down of the 10-20 retaining valves at intermediate points.

2. The ability to travel over undulating or medium grades without damaging shock to the train under conditions that require braking for the proper control of the train speed and for the control of slack.

3. The ability to operate over sections of adverse grades and to make running releases at relatively low train speeds without the resultant harsh change of slack, with possible break-in-twos.

Although the use of the slow direct exhaust position has been known to provide large savings in time and money, it is available at a very low cost either through the conversion of the 10-20 retaining valve or preferably through the use of the latest release control retainer, which incorporates improved design features resulting in materially reduced maintenance costs.

Although it is rather difficult to show in dollars and cents the complete savings that have been produced by incorporating the slow direct exhaust position a saving of over 75 minutes in one 80 mile run and approximately 120 minutes in a 140 mile run serve as examples. In both these cases retainers had to be set up at the top of grades, and the train stopped at the bottom of the grades to turn them down.

Considering the second advantage, which makes it possible to handle long trains over rolling grades with materially improved slack control, the road with the 140-mile run when handling 140 to 150 cars of 9,000 tons or more was not able to prevent draft gear troubles at several points with the retainers set in release position. However, when handling these same trains with some 20 to 25 per cent of the head end cars set in the slow direct exhaust position, the harsh run-out of slack was eliminated and the general handling became entirely satisfactory. In fact, running releases at speeds as low as 20 to 25 m.p.h. were possible, which further reduced the running time. Such releases could not be attempted prior to the use of the slow direct exhaust position.

The third advantage, the ability to make running releases at relatively low speeds, is somewhat tied in with the second advantage, although it is a definite separate feature when considered individually. There are many points on railroads where the grades and curvatures are such that under normal conditions it is not practical to do other than make a complete stop, even though the signals change to a more favorable indication. However, when using the slow direct exhaust position, running release can be attempted with practically no noticeable run out of slack and with the elimination of all shock and damage to the lading.

The advantages provided by the latest release control retainer are of help not only to railroads operating over relatively heavy grades and with heavy tonnage trains, but also on railroads where the grades are from zero to .6 per cent, or where train lengths are relatively long and considerable skill is required in the control of the run-in and the run-out of slack under normal conditions due to curves and changing grades.

Not Enough Cars Now Equipped

The operating economies that are possible through the use of the slow direct exhaust position are so great that they just cannot be ignored, but, unless a major portion of the cars is so equipped, the advantages cannot be fully realized. It now requires special attention on the part of those responsible for the setting up of the retainers to insure that a sufficient number of the retainers are set in the slow direct exhaust position for properly handling the slack control for the tonnage being hauled. Many railroads having experienced the advantages of the release control retainer have initiated a conversion program.

Spot checks made of some of the freight cars in Chicago show approximately 50 per cent of these cars equipped with either a converted retaining valve or a release control retainer; at Pittsburgh and at other yards in the East, a similar check shows approximately 65 per cent so equipped. It may be that these relatively low percentage figures have caused many railroads to hesitate in adopting as standard the use of this new position at points where great economies could be realized. Therefore, we trust that this paper, if it does nothing more, has brought to your attention the need for all railroads to follow through on a program of converting the remaining 10-20 retaining valves to include the fourth position, or for applying the latest release control retainer with its improved design features, to all freight cars being handled in interchange.

The report was a presentation of the Manhattan Air Brake Club.

Discussion

Extensive tests of controlled release were run on a 3½ per cent mountain grade. Some 63 per cent of the cars were equipped with slow direct exhaust, and this, coupled with the dynamic brake on the diesel, was more than enough to handle the trains down the grade satisfactorily. One road found that it costs more to convert existing retainers to the four-position type than to buy new ones. On another road, it costs about $4.00 to convert a valve, $9.00 for a new retainer. On this line new retainers are purchased for new AB brakes applied to cars in place of K brakes, but the old retainers are kept. Close attention must be paid to the filter because dirt will spoil proper operation; dirt caused at least one test to be a failure. It was considered discouraging to find so few cars equipped with the four-position retainer when the conversion can be made so cheaply, and how much it improves

operations. Some roads that could use the four-position retainers to great advantage find that there are not enough cars equipped to make it worth while to instruct crews on how to use the new equipment.

Another member reported that his road started in 1947 to turn up 25 per cent of the retainers on the head end of mineral trains in slow direct exhaust and from 15 to 25 open top cars. The procedure has worked well, eliminating numerous stops, rough handling and break-in-twos. This practice cannot be followed on other trains as not enough foreign cars are equipped with the new retainers. In order to set the retainers in slow direct exhaust on 60 per cent of the cars, it is sometimes necessary to go within 10 or 15 cars of the caboose because of the number of cars in the train not equipped with controlled release retainers. It does no harm to jump three or four of cars without the new retainers.

Measurement of System Leakage

There are two convenient times to find system leakage—during charging in make-up yards, or on repair tracks. In yards, inspectors walk trains to correct audible leakage. In practice, many are found in the brake pipe at either the angle cock or hose coupling. Leakage through the hose or through the valve portions themselves are sometimes not found as they are not loud enough to be heard in many repair yards. Where cars are charged by yard facilities and remain until charged, the system leakage indicator can help carmen determine the amount of leakage, reduce the time spent locating leakage, and tell when the work is completed sufficiently to permit satisfactory train operations.

A device (Pc. 94753) exists for checking system leakage on cuts of freight cars being charged in yards; it is essentially a variable orifice located in the air flow passage with a duplex air gage located across the orifice. The orifice is selected to correspond with the number of cars to be charged. The pressure differential across the orifice indicates the air flow required to maintain system leakage after charging. By selecting the right orifice size for the length, a fixed differential indicates tolerable system leakage for that number of cars.

The indicator has an operating handle for by-passing the measuring orifice, and a brake setting position by which brake pipe pressure can be reduced and the brakes set to enable the operator to measure brake pipe leakage. During this operation it would also be possible to determine if all brakes applied and released.

The system leakage indicator has been made to indicate leakage of approximately ¼ cu. ft. of free air per minute per car. Experience has shown that it is not too difficult to obtain such a degree of tightness, and uniformity of system leakage on departing trains is usually obtainable.

Standardizing Rip Track Leakage

Correcting leakage in make-up yards is, of course, necessary; however, cars which pass through repair tracks should need no further attention when placed into trains if proper attention was given to system leakage on the rip track. Standardization of leakage permitted on cars leaving rip track can be achieved only by providing a means of measuring accurately such leakage. An indication of system leakage is possible by simply lapping the single car tester handle and observing the brake pipe pressure drop for a minute. There proved to be some complications to this method since it required that the control valve remain in charging position.

To determine a more accurate and satisfactory way to apply a flow measuring device to the single car tester and to note results obtainable on rip tracks, the principle employed in the system leakage for train charging was considered for the single car test by using Pos. 2 of the test and noting the differential across the charging choke to indicate air flow.

To improve the accuracy and speed of obtaining an indication, a D-24-B feed valve was arranged to provide a constant air pressure in the brake pipe and to vary supply pressure to maintain through the charging orifice in Pos. 2 the amount of air lost through system leakage. The differential recorded across the single car tester while charging in Pos. 2 indicated the amount of system leakage.

After a car had received a portion of its charge of air, the handle could be moved to Pos. 2 and the charge completed in that position. When the supply pressure did not increase to yard pressure, there was no noticeable delay in completing the charge in the indicating position.

The same duplex air gage used on the single car tester was used for measurement of the differential across the orifice in the tester. Tests were made with a series of larger orifices than used in Pos. 2 but it is believed that this orifice size is best.

Determining Permissible Leakage

The amount of leakage tolerable under such a test has never been determined. Car repairmen with more than usual determination reduce the differential of indication to 5 lb. In the summer months during which the test occurred, ¾ of the cars tested met this figure without corrective measures being necessary.

To determine the amount of air passing through the device and out through system leakage per pound of differential, a check was made using orifices as the leakage source. This orifice proved to be smaller than a No. 80 drill hole peened partially shut and calibrated. This calibration showed that approximately 1/16 cu. ft. per minute air flow corresponded to a 1-lb. pressure differential. Measurement of system leakage is best suited to installations where cars are charged prior to testing, as in yards where inspectors handle other repairs.

With the arrangement of the feed valve to the standard single car tester there was found no interference with the standard test with the exception of the release sensitive test. Releasing an application in Pos. 2 of the single car tester permitted the feed valve pressure to increase to approximately supply pressure and provide a higher driving pressure and consequently greater flow through the choke. This condition could be corrected either by providing a by-pass arrangement to return control of the feed valve to the supply side of the tester when making this test, or by rewriting the release sensitive test to accommodate the change in driving head.

The device is, of course, experimental and not entirely suited for regular service on rip tracks. The action of a feed valve such as a D-24-B type provided the indication desired. It was considerably heavier than desirable and its capacity greater than required. During the measurement of small amounts of leakage, it was necessary to have the valve free of supply valve leakage and most of the demand for air was met by the regulating valve alone.

The duplex air gage was required to read identically at feed valve pressures in order to obtain correct differential readings. The differential, however, was developed rapidly when the single car handle was moved from charging to Pos. 2. This observation indicated the possibility that an improvement in the system leakage indicator, Pc. 94753, used in yard charging plants could be made by use of a D-24-B feed valve instead of an M-3 type. With the latter valve it was necessary to allow the device to remain in indicating position several minutes before a stabilized reading could be obtained. By using the D-24-B valve the indicating differential could be obtained quickly once the indicating position was used.

More work is necessary before a practical device can be made available for general use. There are aspects of the standard single car test codes which must be considered. There most certainly is a variation of opinion as to what leakage is allowable for freight cars leaving repair tracks or charging yards. The allowable leakage for the brake system most certainly should be not more than 400 to 500 cu. in. per minute. It would be better to have the value less than that. With the ¼ cu. ft. per minute figure allowed with the system leakage indicator in yard charging plants, a 150-car train would demand from the locomotive 37½ cu. ft. of air per minute to maintain leakage. It is possible to measure this air flow on a per car basis quickly and accurately on repair tracks, using the principle described, with improvement in indication possible by using better differential reading devices.

The report was prepared by the St. Louis Air Brake Club.

Discussion

A member pointed out that charging time is increased appreciably below 20 degrees, and it is a big problem at zero. This was shown by checking the charging time on one individual car at various temperatures between 45 deg. and 15 deg. On another

test both the valves and an AB test rack were moved outdoors and protected from the weather by canvas. At 7 deg. the charging time took from three to five minutes; at 28 deg. the charging time was within the prescribed test limits. This member thought that the slower charging time at low temperatures caused some to think that leakage was occurring, whereas the real trouble was the cold weather.

Air Leakage on the Individual Car

Each repair track, large or small, throughout the country is the one place where the brake system of the individual car should be thoroughly checked for leakage, and with the single exception of replacement of hose coupling gaskets in train yards, all repairs should be made there. The individual freight car is the source of the train brake system leakage. After a freight car has been made up into a train, it is too late; it takes too much time and means unnecessary expenditure of money to make the necessary and proper repairs. The time and money spent, due to delays because the air brakes are incorrectly maintained and checked while on the repair tracks, could well be spent to provide proper repair work on the individual car.

In the complete air brake system of a freight car there are more than 51 points of possible leakage, exclusive of the brake cylinder. This means that in a charged train of 150 cars there are more than 7,650 points of possible leakage. In a check of 300 freight cars of all types and ownership, the location of major leaks was recorded, and a graph indicating where they were found is shown in Fig. 1. This graph divides the leakage into two groups —brake pipe leakage and system leakage. The former comprised 70 per cent of the leaks found, the latter 30 per cent.

Brake Pipe Leakage in this case is all leakage that can be detected by the brake pipe leakage test of the A.A.R. Single Car Testing Device Code of Tests. Brake System Leakage is leakage which because of the action of the AB valve when applied will not show up as system pipe leakage, and in many cases will not be detected at all.

Of this system leakage, only 3.6 per cent was found to be from the AB gaskets; the rest was broken crossover pipes to the reservoirs, flange fitting gaskets, broken reservoirs, and other leaks, all in the reservoir system. This does not mean that all leakage found on individual railroad cars will be distributed in a 70-30 per cent ratio, but it does illustrate the fact that 30 per cent of the leakage could go undetected by the single car or brake pipe leakage test. These leaks were found by using soap suds and by making a thorough inspection of the air brake system, no matter what the single car leakage test indicated.

If each and every car had leakage, large and small, distributed in the above proportions, we would be able to detect only 70 per cent of the leakage by the single car test in use today. Let us review the method of making a leakage test and see what it tells us.

The A.A.R. test for brake pipe leakage of a train, as determined during the outbound terminal tests, *or of a single car*, as determined by the single car code of tests, defines brake pipe leakage not in terms of the quantity of air lost to the atmosphere, but in terms (p.s.i. per min.) of the significant result of such loss. The actual c.f.m. of free air leaking from the brake pipe will depend upon the number of cars in the train. If each car should uniformly have an amount of brake pipe leakage which would reduce the brake pipe pressure 3 p.s.i. during the first minute immediately after the 15 p.s.i. reduction has been completed, the leakage from the train brake pipe measured in this manner would be observed to be 3 p.s.i. per minute regardless of train length. In making this test the application has caused the *feed grooves of all the triple valves to be closed* and the loss of air is therefore measured from the *brake pipe itself*, including the branch pipes.

Single Car Test Inadequate

The A.A.R. leakage test does not take into consideration air loss from the auxiliary or the emergency reservoir unless the air loss from the auxiliary reservoir is three times that which exists in the brake pipe. Nor does it check leakage of air from the car system at an operating pressure—a fully charged condition. The leakage test of the A.A.R. single car test device code of tests has become recognized as an inadequate way of measuring the amount of air lost from the air brake system of the individual car, particularly since the advent of AB equipment. When it was first introduced, the standard freight brake was the K equipment which had no auxiliary and emergency reservoir pipes, and in fact had a possible system leakage only from the slide valve of the triple valve and past the mounting gasket.

There are long trains operating on the railroads today that will indicate no more than 3 p.s.i. brake pipe leakage, yet they will have more than 10 p.s.i. taper in the trainline, indicating a much higher amount of leakage than would be expected from 3 p.s.i. per minute brake pipe pressure drop. This is true because leakage is read at a pressure which is 15 p.s.i. below operating or fully charged conditions, and because leakage from the brake pipe only is noted in the cab by the engineman. Leakage to the atmosphere from any place in the air brake system will have its effect on brake pipe taper. If we can control brake pipe taper we can control brake pipe leakage. For this reason a test for leakage of air from the individual freight car brake system should be made in such a manner that all loss of air can be measured with the car in a fully charged condition.

What Leakage Is Tolerable?

The question now arises as to how this can be done simply and with a reasonable degree of accuracy. If the amount of air needed to maintain all leakage from the single car brake system (excluding brake cylinder leakage) can be measured accurately with the car in a fully charged condition, then a condemning limit of leakage can be established, and this limit then used to check brake pipe and system leakage as one.

We must establish a maximum allowable leakage limit which will permit a car to be placed anywhere in a train with other cars which also have the maximum amount of permissible leakage and still maintain a taper which is under 10 p.s.i. (The 10 p.s.i. taper now being assumed as maximum permissible). The problem is this: How much air loss, expressed in c.f.m. of free air, can be allowed when the car is charged to 70 p.s.i. brake pipe pressure (the pressure at which the single car brake system is checked) and still keep within the correct limit at brake pipe pressures which in freight service may be as high as 100 p.s.i. under certain circumstances?

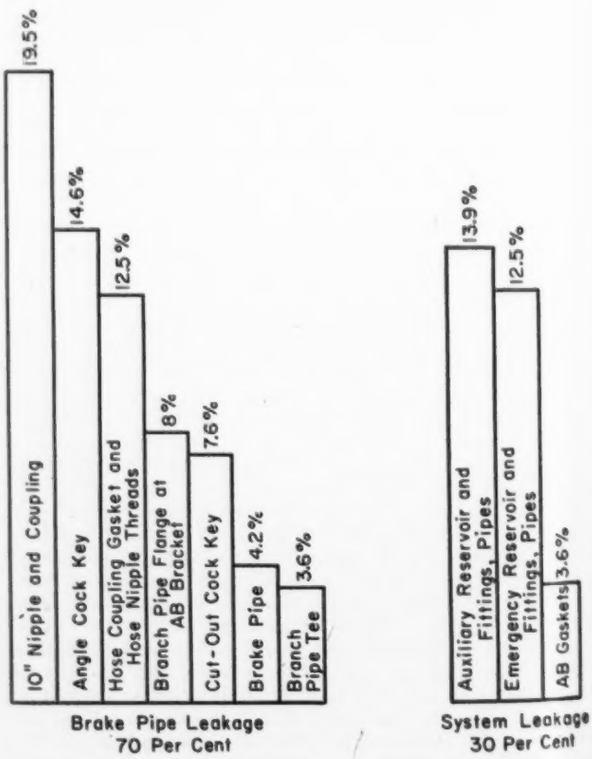


Fig. 1—Percentage distribution of brake-system leakage.

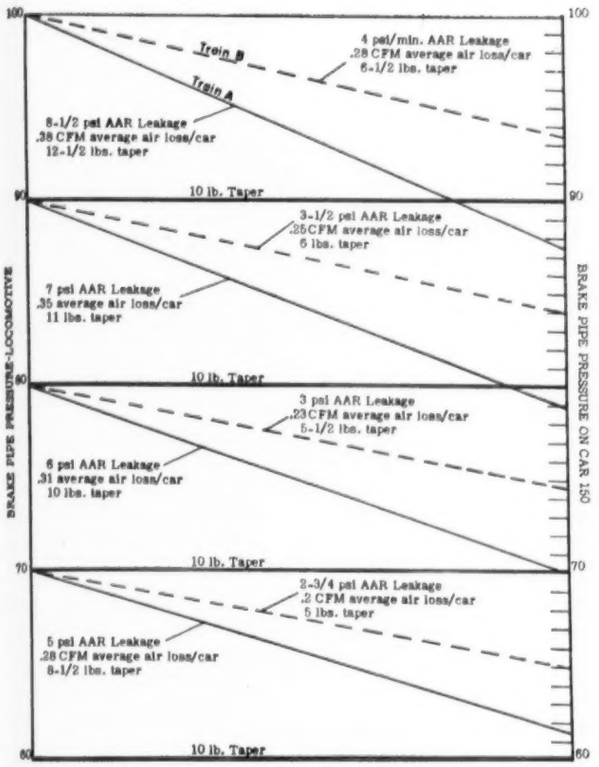


Fig. 2—Two 150-car AB trains with evenly distributed leakage of different amounts.

In Fig. 2 are two trains with two different leakage conditions. Both are 150-car AB trains set up on an indoor test rack for test purposes. Train A (solid lines) had leakage cocks opened in the brake pipe so that the leakage was distributed evenly throughout the train. When checked at 70 p.s.i. brake pipe pressure it was found to have 5 p.s.i. A.A.R. leakage. Train B (dash lines) had 2¾ p.s.i. A.A.R. leakage which was uniformly distributed. Note the average air loss per car for both trains at 70 p.s.i. B.P.; "A" with 0.28 c.f.m. and "B" with 0.20 c.f.m. With all leakage located in the brake pipe, as it was with these trains, it can be seen that 0.08 c.f.m. is the difference in air loss per car which increases the train's brake pipe leakage from 2¾ to 5 p.s.i. The extra 0.08 c.f.m. per car also increases the taper from 5 p.s.i. to 8½ p.s.i. Let us suppose train "B" had 0.08 c.f.m. leakage from the auxiliary reservoir of each and every car, in addition to the 0.20 c.f.m. leakage per car from the brake pipe. Now we would see that the taper of trains A and B would be the same, but their A.A.R. leakage would remain 5 p.s.i. and 2¾ p.s.i. as shown in the graph.

Next, notice the effect on A.A.R. leakage, on average car air loss, and on taper of an increased brake pipe pressure. With a 90 p.s.i. brake pipe pressure, train A now has a taper which is greater than 10 p.s.i. The A.A.R. leakage for this train has increased 2 p.s.i. per minute, and the average air loss per car has increased from 0.28 to 0.35 c.f.m. Train B still has only 3½ p.s.i. per minute leakage and less than 10 p.s.i. taper. At 100 p.s.i. charged brake pipe pressure, train A would have intolerable A.A.R. leakage and taper, but train "B" would have its A.A.R. leakage increased only to 4 p.s.i. and its taper still well within a 10 p.s.i. limit. If train B's cars were to be checked individually at 70 p.s.i. for system leakage, it would be found that the cars at the head end had 0.20 c.f.m. air loss while those at the rear would have a slightly greater amount of leakage, about 0.21 or 0.22 c.f.m. due to the difference in driving head at the points of leakage. This difference is a result of train taper. From this analysis and other data concerning freight train leakage, it seems probable that a very acceptable condemning limit under full charge of 70 p.s.i. for the total leakage from the single car as it leaves the repair track would be 0.22 c.f.m. of free air. This value represents approximately 4 p.s.i. per minute A.A.R. leakage on the single car (some slight variations due to different car lengths). Therefore, if it were all in the brake pipe, the standard single car test would require reduction to 2 p.s.i. or less. Also, this value has sufficient margin of safety to prevent the location of leakage in a train from influencing the taper to an intolerable degree.

The above settles the question of what should be measured and how much air loss should be allowed, but still leaves the most difficult question of what sort of apparatus can be found to measure accurately a leakage of the small order of 0.22 c.f.m. free air when it is being lost from a system charged to 70 p.s.i. When consideration is given to the fact that the air lost can be determined only by a corresponding inflow of air into the car brake system and to the fact that this flow at the condemning limit is only .039 actual c.f.m. in the pipe, it becomes obvious that a suitable flow measuring device must be very superior in its ability to indicate accurately the feeblest of air currents.

Accuracy of Measurement

This may well lead to the question of how we determined the information previously mentioned in this paper in connection with the amount and location of leakage in the individual car. After searching for some time for a suitable and accurate indicator for small rates of flow, we found that a pressure adaptation of the atmospheric flowrator we have used on individual test racks could be worked out well within the limits of flow desired and with an accuracy plus or minus 5 per cent. A test apparatus of even better accuracy was set up for the explorations that have been made thus far. The flowrator consists of a float enclosed in a tapered glass tube which is graduated to indicate the amount of air that is passing through the indicator. The one used to check leakage from the brake system of freight cars was calibrated to read in cubic feet of free air flow per minute at 70 p.s.i. pressure. Of course, steady flow of air is necessary for a quick check, so that any reducing valve that will maintain a

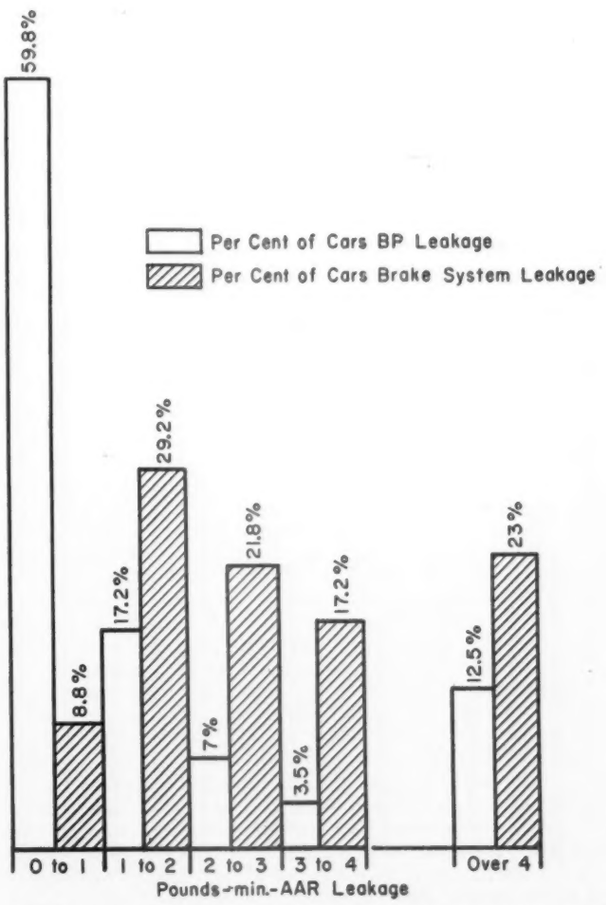


Fig. 3—Comparison between leakages by the A.A.R. test (white bars) and air loss equivalent to those leakages (cross-hatch bars).

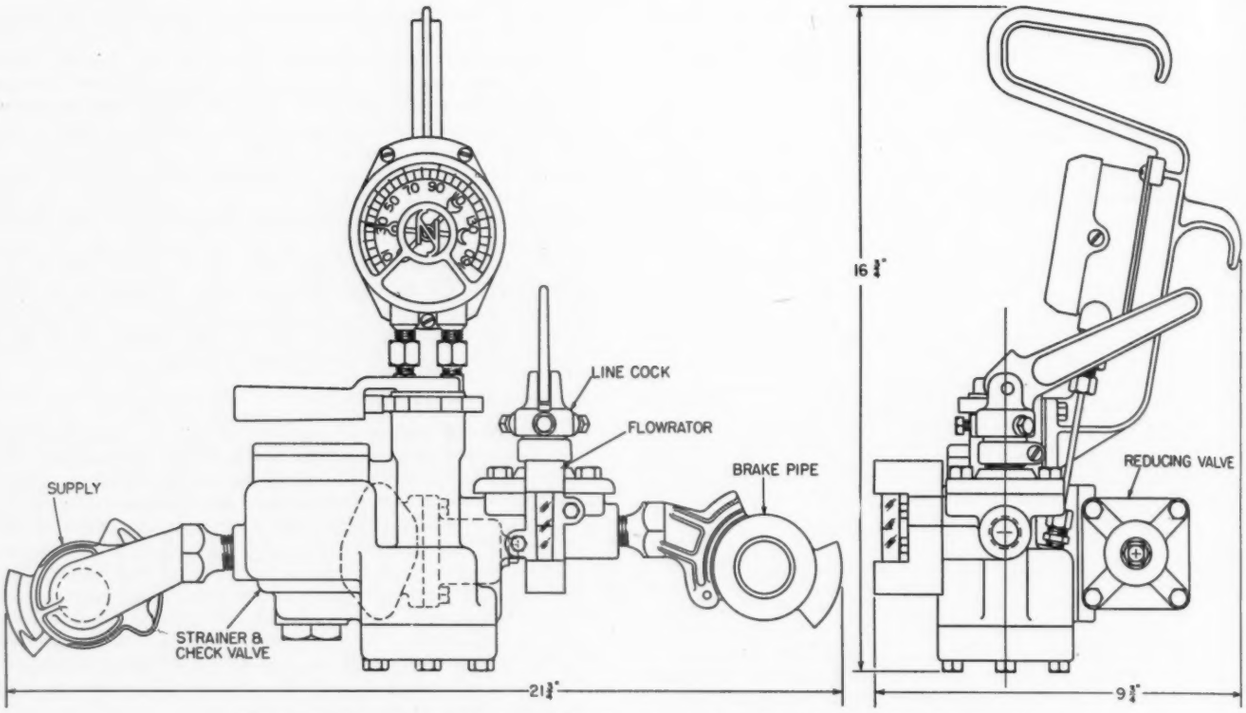


Fig. 4—Single car testing device with a flowrator and special reducing valves incorporated.

constant pressure at a low rate of flow can be used as a supply regulating valve. The flow must remain even and cannot fluctuate in pulses. The amount of flow is in no way affected by the difference in brake pipe volume found in the various types of cars.

Weaknesses of Existing Tests

About 300 cars were checked for leakage this summer, both with the flowrator and with the standard single car tester. Some cars were checked before any work was done to the air brake system, others during and after work. All types of cars from all railroads were tested. In order to establish a uniform length of time for charging, the 15-min. limit was used, though a record of the flow was taken at 10-minutes and 12 minutes after air was applied to the car. After the flow reading had been recorded, an A.A.R. leakage test was made of the car in question and the results compared. Fig. 3 compares A.A.R. Brake Pipe Leakage, as indicated by single car tester, and actual air loss from entire brake system, as indicated by the flowrator, expressed in terms of A.A.R. leakage at 70-lb. brake pipe pressure.

This graph shows a most interesting situation—59.8 per cent of the cars checked, using the A.A.R. leakage test, had leakage that was between 0 and 1 p.s.i. per minute, but actually only 8.8 per cent of the cars had the equivalent of 0 to 1 p.s.i. leakage; 17.2 per cent of the cars had from 1 to 2 p.s.i. A.A.R. leakage, but 29.2 per cent had the equivalent air loss of 1 to 2 p.s.i. leakage. According to the single car test method of checking A.A.R. leakage, 22 per cent were found to be over the 2 p.s.i. maximum. Actually, in terms of the equivalent of air loss, 62 per cent of the cars had more than the equivalent of 2 p.s.i. A.A.R. leakage. This is due to the system leakage that goes undetected by the single car test when the brake pipe leakage test is made.

An example of this, though an extreme case, is not too unusual. A fully charged car, having been on air for 15 minutes, when checked by the system leakage checking device, showed a 0.6 c.f.m. air loss from the brake system. If the 0.6 c.f.m. air loss were all in the brake pipe, it would mean that a pressure drop of around 11 p.s.i. per minute would be indicated. As the situation was, all the leakage was from a broken emergency crossover pipe and the brake pipe was in A-1 condition. The single car leakage test showed this car to have zero brake pipe leakage. It is because of this unchecked system leakage that some trains with low brake pipe leakage will have more than the maximum brake pipe taper.

If 300 or 400 different cars had been checked, the proportion between brake pipe leakage and brake system leakage might have been somewhat different, but it is believed that the group of cars used is representative of summer month conditions. It is our intention to project the investigation into the coming winter months to determine the location and proportion of the system leakage under subzero conditions. The results should make an interesting comparison with Figs. 1 and 3 and settle much of the conflicting speculation on the causes for failure to get long trains properly charged.

Conclusions from the Tests

Investigation of leakage on the individual car has shown:

1. That 70 per cent of the leaks found on cars under summer conditions were located in the brake pipe and its appurtenances. The other 30 per cent were system leaks which are not readily detected and which do not affect brake pipe leakage.
2. That leakage from the individual car system apart from brake pipe leakage has a large effect upon the brake pipe taper in long trains.
3. That a check of the brake pipe leakage alone is not adequate to determine the fitness of a freight car brake system for long-train operation.
4. That a device for use in conjunction with the single car test device for detecting the rate of leakage flow from a single car brake system is entirely practical.
5. That such a device should be calibrated to indicate a condemning rate of 0.22 c.f.m. free air while the car is held charged to 70 p.s.i.

That with this calibration only one car in four will require complete investigation of all pipes and joints for leakage.

Serious thought should be given to the desirability of adopting the flowrator device in conjunction with the single car test device as a part of the repair track operations. To aid the winter investigation some single car test devices have been built which include special flowrators and suitable reducing valves. Fig. 4 shows in outline form the proposed assembly combination. With it a car may be charged on a repair track through the normal 15-min. period prior to running the single car tests; at the end of that time the line cock may be closed to get an immediate indication of the total system leakage of the car. If the float of the flowrator is above the condemning line, the leaks must be located and corrected before proceeding with the single car tests. So long as the float does not indicate excessive leakage, the single car tests may

immediately be started, leaving the final determination of the leakage condition to the standard brake pipe leakage test.

It is our belief that if elaborate investigation of leakage from a brake system on a car is clearly shown to be necessary only in one car out of four, there should result a prompt interest in effecting proper repairs to such car and a marked increase in the overall efficiency of air brake maintenance at repair tracks through more effective assignment of available man-hours.

The report was prepared by M. J. Alger, Jr., Project Engineer, The New York Air Brake Company.

The Brake Cylinder Release Valve

The brake cylinder release valve when used with the AB freight brake equipment provides for a considerable saving in operating time and personnel as well as a saving in the amount of air required for recharging car reservoirs if they have been bled for switching. In evaluating the advantages from the economic standpoint, consideration must be given covering practices in handling cars in various yards, since each yard presents its own operating problems.

Bleeding is the process of releasing the air from car brake cylinders and reservoirs of individual cars in preparation for movement without air. With AB brake equipment it is necessary to pull the release rod and hold it open until air is drained from brake cylinders and auxiliary and emergency reservoirs. With the brake cyinder release valve, the brake cylinder alone is drained. The valve is designed to complete the draining with a manual operation that is only momentary, the operation requiring only one light pull or push on the brake cylinder release rod.

A test was conducted under AAR supervision in 1948 on 21 GN 24-ft. ore cars which developed that 7 minutes and 41 seconds was required to bleed standard AB equipment on these cars whereas, with the brake cylinder release valve, one minute 37 seconds was required to bleed the same cars. This shows approximately 80 per cent time saved by use of the brake cylinder release valve. However in ordinary yard practices the average time used per freight car is nearer 30 to 35 seconds, and the time saving in the bleeding and movement of cars is about 70 per cent.

A common practice in yards is to block open AB valve release rods to avoid waiting for a complete release of the air system. This is undesirable as often the blocking is not removed, causing trouble and delays in recharging and making outgoing brake tests. Further, individuals that persist in blocking often spend more time finding some object with which to block the release valve rod than it ordinarily takes to bleed the car. Since there is no waiting with the brake cylinder release valve, this practice would be discontinued.

The practice in some yards is to bleed cars on the inbound inspection, either by car inspectors, switchmen or additional personnel. With the brake cylinder release valve, services of special or additional personnel could be dispensed with, since it would require only a momentary pull on the release rod and it could be arranged to have inspectors do the bleeding as part of their regular duties. Where inspectors would do the bleeding along with their regular inspections, a saving of approximately 6 hours per 1,000 cars handled, can be assumed. This could be converted either to a saving in personnel or to faster movement in yard operations. In yards where bleeding is not combined with the incoming inspection, time is often critical since switching operations must then wait until bleeding is done.

Advantages During Charging

The major advantages of the brake cylinder release valve shows up in charging outgoing trains as only the air in the brake cylinder is released; the reservoirs retain approximately 60 psi.

It is generally accepted that a time interval of 12, 18, 30, 40 and 60 minutes are required to charge trains of 25, 50, 75, 100 and 125 cars, respectively, to a point where an outgoing air test can be made. Assuming that individual car brake system leakage would reduce the retained reservoir pressure to around 50 per sq. in., a saving of approximately 50 per cent in delay to outgoing trains would be affected.

In yards handling maximum traffic, considering crews, motive power and yard facilities tied up, such as make up tracks not long enough to accommodate full train length, time saved would be important as trains extending out on to switch leads tie up switching operations until train is moved out of yard.

Some yards employ expensive charging plants, which have high maintenance costs and in some climates are unreliable during winter months and cannot be used.

When present AB brake equipment is bled, all the air in 6,000 cu. in. of reservoir volume is exhausted. A yard handling 1,000 cars per day would require approximately 10,000 cu. ft. of free air, not taking leakage into consideration. Thus an appreciable saving in fuel costs and compressor wear could be credited to the use of the brake cylinder release valve.

There are two types of brake cylinder release valves, the QR being the first one to be installed on interchange cars. It was unsatisfactory for interchange cars when retainers were used and happened to be turned up. If it were found necessary to release a car brake, operation of the release valve would release the car brakes but would not reset when the AB service piston moved to release position. This being the case the brake on this particular car could not be set while the retainer was turned up.

The QRR overcomes this undesirable condition, and may be obtained for right or left hand installation or for mounting on a modified AB pipe bracket.

This report was prepared and presented by L. A. Stanton, general air brake supervisor, GN.

Standardization on Diesel and Turbo Locomotives

Due to the different builders using various sized air hose for, in many cases the same use, it is at present necessary for the railroads to carry in stock as many as two dozen different sizes of hose. There is a definite need for a uniform piping arrangement which will utilize a minimum number of standard hose sizes.

In view of this association and the A.A.R. recommending that all locomotives be equipped with either 6 BL, 6 SL, or 24 RL brake equipment, only the hose necessary for the above equipments and the present designs of locomotives were considered.

While piece numbers are listed for armored hose, there are no objections to the use of rubber hose, providing the recommended sizes are maintained.

The committee therefore recommends for transmittal to the A.A.R. brake and brake equipment committee, for further handling with the committee on locomotive construction, the need for a uniform piping arrangement on all locomotive units, regardless of builder, which will utilize a minimum number of standard hose sizes. To assist in this recommendation, a grouping of hose according to use, is given in the table.

Location of Equipment

In the past, the location of operating devices, brake valves, rotair valves, foot pedal, reverser, throttle and air gages were made with too little consideration given to contortions necessary

GROUPING OF HOSES ACCORDING TO USE

Use	Size	Coupling	Piece No. N.Y.A.B.	Piece No. W.A.B.
Main reservoir equalizing pipe end connection	1¼ in. by 23 in.	L S-4	N-3755	505428
Distributing valve equalizing pipe end connection	⅞ in. by 25 in.	E S-3	N-6872	538402
Signal pipe end connection	⅞ in. by 25 in.	H S-3	N-6055	529856
Signal pipe line connection	⅞ in. by 25 in.	—	N-4971	539684
Underframe to truck, brake cylinder line connection	⅞ in. by 25 in.	—	N-4971	539684
Brake pipe end connection	1¾ in. by 23 in.	F S-5	N-3751	505247
Brake pipe line connection	1¾ in. by 22 in.	F S-5	N-7369	539636
Electro-Pneumatic straight air pipe end connection	⅝ in. by 25 in.	E S-2	N-4333	511890
Electro-Pneumatic straight air pipe line connection	⅝ in. by 25 in.	—	N-4028	509960
Independent application and release pipe end connection	⅝ in. by 24 in.	H S-2	N-3754	505427
Actuating pipe end connection	⅝ in. by 24 in.	H S-2	N-3754	505427
Sander operating pipe end connection	⅝ in. by 24 in.	H S-2	N-3754	505427
Pneumatic throttle pipe end connection	⅝ in. by 24 in.	H S-2	N-3754	505427

by enginemen when operating forward or reverse. Space for inspection and adjustment of devices, and visibility afforded enginemen when manipulating devices, was not given too much attention.

Inspection of a considerable number of units clearly indicated that to arrive at a reasonable recommendation, extensive examination of possible cab arrangements would have to be made, taking into account the assorted sizes of men who operate such units and availability of space in cabs already in service. Through the use of mock-ups and with movable equipment, exhaustive studies were made to provide a comfortable cab arrangement with items located for inspection and removal.

Road Switch: Center line of automatic brake valve approximately 39 in. from cab side wall, 16½ in. from center line of controller stand and 8½ in. ahead of center line of enginemen's seat, 40 in. from floor to automatic brake valve handle and at the left of the engineman when facing forward.

Switch Power: Same as road switch with some variation permitted due to cab size and except where age and previous arrangements cannot be economically changed, center line of controller stand approximately 35 in. from front cab wall and 38 in. from side cab wall. The center line of the automatic brake valve should be 17 in. ahead of the controller stand and 15 in. from cab side wall, thus placing the brake valve ahead of the engineman when facing forward, with the handle being about 40 in. from floor.

Road Power: In general location of equipment is fair from an operating standpoint but is subject to improvement for better maintenance. Later models have shown consideration by builders, but the older types can be improved by rotating the brake valve pedestal so as to expose the feed valve for inspection and removal as well as relocating or protecting the rotair valve from damage and making the escutcheon plate visible.

An item of frequent condemnation and confusion is the use of non-standard angle cocks in brake pipe connections. In spite of efforts to educate maintenance and inspection forces, all too frequently inspectors have improperly positioned cocks substituted for angle cocks. Maintenance forces have misapplied such cocks and even taken end cocks apart and changed the handle position to conform to that of a cutout cock.

Consequently it was recommended that:

For road locomotives standard angle cocks be used for all brake pipe connections. Where structural characteristics are such as to preclude the use of an angle cock, a brake pipe end cock may be used having a double locking handle so installed as to be easily visible so that handle position can be readily checked. For switch power the use of angle cocks is preferable. When necessary double locking cut out cocks may be used.

Time and operating experience has indicated that certain features of the 24 RL brake schedule can be eliminated without impairing the general purpose of the brake. A number of roads have eliminated all or at least one of the questionable features from the locomotive brake schedule.

Three Unessential Features

The human element has in a great measure been responsible for accidents involving controlled emergency brake applications on locomotives, in that the rotair valve was improperly positioned. Records indicate that a greater per cent of brake emergencies are not initiated from the locomotive, but instead, from car brakes functioning in undesired emergency during service braking, train separation and by improper handling by the conductor's valve.

We are all familiar with the intended controlled emergency brake cylinder pressure built up on the locomotive but question the wisdom of a delay, greater than the time of full brake cylinder pressure on the car brakes, especially since there is no system of control as to locating loads and empties in the train make up.

Any delay of brake cylinder build up on the locomotive can be controlled by the engineman by proper handling. An emergency application should obtain the quickest brake cylinder pressure build up, automatically, and let the engineman decide upon any delay period and give the proper handling in line with the conditions and as provided by the rules of the management.

The controlled emergency feature when used with dead units in tow is not synchronized to function in brake cylinder pressure timing with car brakes, either freight or passenger. The delay to build up of brake cylinder pressure when a locomotive is moving light or handling a few cars when switching and controlled emergency feature cut in, has resulted in loss of life, personal injury and extensive property damage.

Some railroads have removed the controlled emergency portion from the D-24 control valve and have experienced far less troubles than those who endeavor to change from non-controlled to controlled emergency, when train length exceeds a certain number of cars.

Some lines have pegged the rotair valve for passenger and passenger lap positions only, others have built up the rotair valve quadrant between passenger lap and freight lap positions, so the handle cannot be moved to a position to give controlled emergency, and others have removed the controlled emergency portion from the D-24 control valve, replacing it with a blanking plate. Why clean and maintain a device not used?

The safety control feature has its merits but since it is not universal in its application, becomes a nuisance rather than an asset. Enginemen cut out this feature for various reasons but mainly because of having to hold the foot pedal depressed. Seals are broken on cutout valves and this feature cut out when any unusual conditions of the brake equipment occurs. Some railroads permit of cutting out of the safety control when a locomotive so equipped is used in local service doing switching, then it is never again cut in on the trip.

The confusion comes from not all locomotives used on a district being equipped with safety control, the engineman forgetting and removing his feet from the pedal. The recovery of the brake, resetting the PC switch or even starting the diesel engines that stopped has caused bad train delays. Where two or more employees are in the cab, there is no necessity for such a device.

Railroads who desire the safety control feature as a part of their brake schedule, should remove all means of cutting out this feature and assess a penalty to those responsible for inserting a blind gasket in the piping except under certain emergency instructions. A half-way method of maintaining or supervising those handling this feature of the brake schedule, is far more damaging than removing it from the 24 RL brake equipment. High maintenance and inspection costs to meet requirements, only to have the engineman close a cut out cock in the air line, cutting out this feature, is not profitable. The safety control feature should be removed from the basic locomotive brake schedule.

The overspeed protection feature in its present application has proven uneconomical in maintenance and unreliable in performance. One railroad represented in this committee has less than 25 per cent of its freight and passenger units so equipped. The passenger units so equipped have the speedometer connected to the idling wheels of the truck and gear ratio for 20 per cent above the system maximum allowable speed. Such an application will not function for the purpose intended and does not provide protection from overspeed of the traction motor armature when power driven wheels slip. When the speedometer is connected to a power driven wheel or axle, only that traction motor armature is given overspeed protection; other traction motor armatures get their protection from the wheel slip relays. What protection is given the armatures on booster unit traction motors of a lower gear ratio than the lead unit having overspeed protection feature, when the lower gear ratio speed is exceeded, except with good instructions? If instructions meet requirements in one instance why the overspeed protection feature? The overspeed protection feature in its present application is inadequate and misleading. By proper check of speed tapes by the road foremen and corrective handling, greater benefits will be attained than by relying on a device set to function at a speed far higher than the maximum allowable speed.

Where to Place Equipment

In order to prevent the accumulation of moisture and the possibility of freezing in sub zero weather, control valves, master controllers, relay valves, 21-B magnet valves and other similar pieces of the locomotive brake equipment, when practical, should be located inside the locomotive in a place where they will not be exposed to excessive heat or severe outside temperatures.

The ideal location for this equipment on conventional type pas-

senger and through freight locomotives is along the right engine room wall or in the nose of the unit, thereby eliminating excessive piping. However, they must be so spaced that the removable parts requiring periodic cleaning and testing can be removed without disconnecting pipes or interfering with other equipment.

If the brake equipment must be placed beneath the cab floor, suitable openings in the side wall should be provided to reach these portions, especially if the head clearance between the engine room and cab floors is less than 40 in.

On road and yard switchers, where sufficient inside space is not available, making it necessary to place the control valve, relay valve, etc., outside, it is preferable to locate them on the running board or some other suitable place above the locomotive frame.

Combined reservoirs (auxiliary, emergency and displacement) may be located either inside or underneath the locomotive frame, provided the displacement reservoir head is accessible for changing the diaphragm.

Main reservoirs, in addition to being placed in the coolest spot possible, should be arranged so they may be subjected to hydrostatic pressure without difficulty and the entire surface hammer tested by turning the reservoir in its bracket without removing from the locomotive.

Due to early and continued efforts of builders to keep the dashboard type of cowling with several gages contained therein, air gages were introduced that were of such diameter as to make visibility hard of accomplishment regardless of method of lighting. As it is important that gages indicating air brake pressures be easily visible and susceptible to the least accumulation of dust as is possible, air brake gages for road power should preferably be of 5 in. diameter and not less than 3½ in. For switch power the gages may be 3½ in. in diameter so mounted as to be well lighted and easily cleaned and inspected.

The report was submitted by a committee of which C. E. Miller. N. Y. C., is chairman.

Discussion

There was some disagreement with the part of the paper which advocated removing all means of cutting out the safety control feature. A W. A. B. man said that standardization helped the builder of air brake equipment because it promotes economy of manufacture and it simplifies the stores problem. The diesel builders want standard equipment to which specialties can be added, or subtracted, as requested by individual railroads. He said that the safety control feature was developed with the cooperation of one of the brotherhoods who chose what the time delay should be. He added a word of caution on omitting the controlled emergency feature. This was developed as a result of A.A.R. power brake tests run from 1925 to 1931. If the times have changed to the extent that this feature is no longer desired, it can be left off as the individual railroads may choose. He thought, however, that we should be careful before endorsing such a recommendation.

Reasons advanced by members recommending that the Air Brake Association not go on record as favoring the elimination of controlled emergency were: it reduces slack and shock; it synchronizes the locomotive brake pressure with the train brake pressure; and it can be nullified with the independent brake if so desired. As an example of what it can do one member said a very smooth test stop was made with 100 empty hoppers with controlled emergency and without power. One road that has annulled the controlled emergency feature, however, reports no trouble.

The question was raised as to whether it should continue to be necessary to hammer test main reservoirs as the enamel inside coating is applied to prevent corrosion. A Westinghouse member said that the manufacturer designs the reservoir with adequate metal for strength plus some extra for corrosion, and then enamels it as added protection. A railroad member said his road finds it economical to keep a spare set of reservoirs which are washed with steam and hot water. All failures found were discovered on hammer tests and none on hydrostatic tests. Another member mentioned that reservoirs have to be cleaned to get out the muck and the oil from the air compressor, and therefore have to be removed from the locomotive. Some states are accepting an inspection hole in the reservoir as a substitute for hammer testing, this gives good visual inspection inside as well as outside.

C. E. Miller, the committee chairman, recommended that the paper be adopted as representing the majority of the committee, but not necessarily of the entire association. He favored each railroad looking upon the report as a general basis for its own policy modified as necessary to suit individual circumstances. The recommendation was adopted.

Car Men Are Told To Get Busy and Reduce Hot Boxes

W. N. Messimer, President
(General superintendent equipment, Merchants Dispatch Transportation Corp.)

A. H. Keys, Vice-Pres.
(Superintendent car department, B. & O.)

C.D.O.A. in annual meeting is urged to redouble its efforts in hot box prevention and the more efficient use of cars

THE Car Department Officers' Association held its 12th annual meeting at the Hotel Sherman, Chicago, September 15 to 17, inclusive.

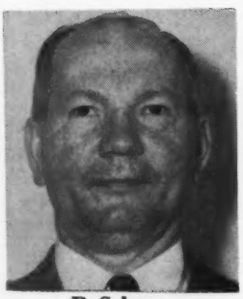
At the opening session, A. E. Wright, president and general manager, Manufacturers Railway and St. Louis Refrigerator Car Company, discussed the subject, Personnel and Personnel Relations and maintained that it does not receive deserved attention on most railroads. He said it is no use to effect marked improvements through technical research and not develop trained men to put these improvements in practical use. Mr. Wright urged that some means be found: (1) to encourage more promising young people to enter railway service; (2) to develop supervisors with real qualities of leadership; (3) to educate, cultivate and stimulate men in the ranks. He said that most men are activated by something besides the dollar sign and it is the definite responsibility of management to create a place where men enjoy working, where a favorable atmosphere is maintained and men can take pride in their work. In closing, Mr. Wright called attention to an expenditure of roughly $7 billion for new capital investment by railroads since V-J day and asked how much they have spent on the human machine in that time.

President Messimer's Remarks

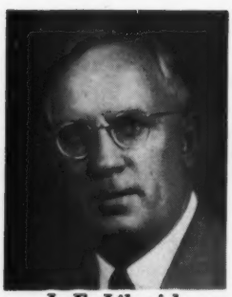
In opening the convention, President W. N. Messimer, Merchants Dispatch Transportation Corporation, said the association is now recognized as a going concern with a present membership of 1,165 individual members, sound if somewhat limited finances and an increasing influence for the improvement of railway car conditions generally.

Committee reports on the first day included Interchange and Billing for Car Repairs, presented by Chairman J. J. Sheehan, supervisor of car repair billing, M. P.; Air Conditioning Equipment, by R. F. Daugherty, general electrical and air-conditioning inspector, U. P.; and A.A.R. Loading Rules, by A. C. Bender, joint supervisor of car inspection, Cleveland Car Inspection Association.

On the second day, the report on Conditioning Cars for Higher Commodity Classification was presented by Chairman T. E. Hart, chief car inspector, Nickel Plate, with prepared discussion by C. A. Naffziger, director, A.A.R. Freight Loss and Damage Prevention Section. The report on Car Lubrication was read by Chairman K. H. Carpenter, superintendent car department, D. L. & W. and discussed including comments by W. M. Keller, director of mechanical research, A.A.R.



R. Schey, Vice-Pres.
(General superintendent car department, N. Y. C. & St. L.)



J. F. Likarish, Vice-Pres.
(Master car builder, G. N.)

E. E. Packard, Vice-Pres.
(District master car repairer, S. P.)

F. H. Stremmel, Sec.-Treas.
(Assistant to secretary, Mech. Div., A. A. R.)

Other committee reports on the last day included Analysis of Train Yard Operations, read by Chairman W. B. Medill, district master car repairer, S. P.; Wheel Shop Practices, by E. W. Kline, general wheel shop foreman, B. & O.; Painting, by Chairman F. M. Vogel, painter foreman, D. & R. G. W.

Report of Committee on Painting

The first and most important consideration in any paint job is to have a clean working surface. This may be obtained by washing, or by sand-blasting. Without a properly prepared surface we cannot expect a good job, and the paint and labor invested will be wasted.

In some cases, new metal panels are installed on old equipment and they must be properly prepared before being painted. This can be done by sand-blasting or by washing with an efficient solvent. After washing, they should be etched with phosphoric acid and the acid should be cleaned off with alcohol and water. For a new surface, or one which has been sand-blasted, a good primer properly applied is an excellent start in heading off rust and corrosion.

The number of undercoats and finish coats to be applied will in large be determined by service requirements and experience.

In the past we have discussed the advantages of both brush and spray lettering, and the use of stencils and masking tape. We will discuss, later, lettering and the effect of car washers on this work. We have found that car washers are hard on putty and glazing compounds and the use of these materials should be kept to a minimum on exterior painting.

Painting Diesel Locomotives

In general, the painting practices used in car painting can be extended to diesel locomotives, except that the light metal used on diesels should be taken into consideration insofar as sand-blasting is involved. We must also consider the effect of sand and dirt getting into electrical equipment of diesels when sand-blasting is used. We believe the best method on diesels is the use of a stripper, which should be washed off, and the surface treated with phosphoric acid. We have had good results using both enamel and lacquer for diesel interiors. The interiors, of course, require thorough cleaning before painting.

Various methods have been presented for the handling of galvanized car roofs, and the question arises as to whether or not they should be painted. Some roads wash with an acid, while others use a primer containing phosphoric acid. This should be necessary on new roofs, but years of experience have shown that after a roof has aged for a few years it becomes oxidized and will hold any good paint.

Before any application of car cement, a good primer coat should be used.

Stencilling Milwaukee Passenger Cars

In lettering and stencilling Milwaukee passenger equipment, the old method was to apply two coats of lettering enamel by hand.

Later, metal stencils with raised wire bridge ties were used, but it was found not practical to spray a sharp edge on account of rivet heads, buttons, etc., causing under stencil fogging. Still later, the move was to ready-cut masked stencils, either hand-cut or machine-cut. An adhesive coating was applied to the letter board that placed these stencils in their proper places and then cut out the ties and sprayed two coats of enamel. This method does a nice sharp-edged job and the paper masked stencil must be removed before the paint is thoroughly dried.

Because of the wear on embossed letters by mechanical washers, the Milwaukee is now applying the lettering and striping material two coats and then masking these before applying finish coats. In this way, the lettering and striping recessed is below the level of the finish coat. This system also has its draw-backs as when cutting out the letters, if the operator uses too much pressure with the knife he may cut through the finish film.

Ten cars have maroon Scotchlite reflective cutout letters applied on them for test. These cars have not been in service long enough to report on the durability of this material.

Cleaning N. Y. C. Air-Conditioning Parts

In cleaning air-conditioning ducts, evaporator and condenser on N.Y.C. passenger cars the various operations are as follows:

(1) Cover all seats and upholstery, using canvas covers. Open zipper of flexible duct or remove flexible duct at end duct opening and evaporator. Lower hinged ducts and check all ventilators to be sure they are in opened position throughout car. Operator to wear hood type respirator for blowing out ducts.

(2) Clean out ducts, using air hose with pipe connection at end of hose to enable operator to extend air into duct at evaporator end of car, using approximately 90 lb. air pressure, keeping air hose in motion across width of duct, allowing approximately 20 min. for this operation. Move air hose to duct openings throughout car, blowing off fins and interior of ducts at each opening. Move air hose to duct opening at evaporator and for the second blowing at this opening, blowing out duct for an additional 15 min. or until no evidence of dust remains in duct.

(3) Clean evaporator. Operator to wear goggles during this operation. Check evaporator drain pan to be sure overflow hole is open. Prepare cleaning solution, using mild alkaline solution 4 oz. per gallon of water, preparing 5 gallons of material, heat to approximately 180 deg. F., spray the evaporator from both sides, using mild alkaline solution, spray gun or equivalent, taking care to blank the opposite side of the evaporator from which the spray is being directed to prevent the solution from getting on other parts of the car. Use the entire 5 gal. of solution, dividing it between both sides and then rinse the evaporator using 5 gal. of clear warm water, using same spray gun.

(4) Cleaning condenser—first blow off, using compressed air. Operator to wear goggles and rubber gloves during this operation. Prepare a cleaning solution of Mineral Acid (Baume 20 deg.), weak acid solution, use 5 oz. of solution per gallon of water, making 5 gallons of material. Heat to approximately 180 deg.

(5) Mineral Acid Solution, use 12 lb. of acid to 5 gal. of water (note, it is dangerous to apply water to acid, always apply acid to water). Using either solution, spray both the condenser from both sides and ends, using spray gun or equivalent. Use the entire 5 gal. of cleaning solution, dividing it over the entire condenser. Rinse, using 5 gal. of warm clear water, using same spray gun. Stones and foreign objects can then be removed from fins, using a piece of sharpened wood or a bent piece of wire.

I. C. Terminal Painting

The terminal painting of passenger cars in the past few years has been due to the heavy demand on shop facilities for repainting streamlined equipment. The shop facilities have, in many cases, become inadequate to take care of the painting of some of the conventional head-end and passenger equipment.

To take care of this situation many railroads have come to the conclusion that some of this equipment be painted at terminal points. In many cases equipment in good mechanical condition with paint in poor condition should be painted so that cars will be available for service without the expense of taking them into shops and out of service for any length of time.

This type of painting should be done with much consideration and reservation. The men selected to do this type of work should be qualified painters, and well supervised. Weather conditions must be observed closely as they play an important part in the appearance and durability of painted equipment; as most of this type of work must be handled out in the open.

The exterior equipment to be painted should be thoroughly cleaned. All blisters and loose paint to be scraped off, rust spots to be sanded out and all bare metal primed before putty is applied to scratches and bruises in the old surface. The entire surface to be painted should be well sanded with fine sand paper. All windows and chrome parts to be masked with either paper or masking composition.

The car is now ready for paint. Care must be taken that proper paint is used. If lacquer is to be used, a coat of surfacer should be sprayed on car before finish coats are applied. If spraying synthetic enamels, the usual light or fog coat is first applied, followed by one, two or three medium coats.

The interior painting of equipment should be handled with a great deal of care. Painting should be done only when necessary. In many cases hallways and end bulk heads are painted far too often, and these are painted without washing or sanding. Many times a good washing would be far better than the application of paint over dirty walls.

Next, the subject of removing paint from perforated ceilings. The preferred method is by the removal of the ceiling panels from the car and then removing the paint from the panels with a suitable solution, remembering that for the most part the metal used in their construction is aluminum.

In some cases, where the removal of the panels is not possible, sand-blasting, using spent sand with proper air pressure and a

well-educated sand-blast operator, has been used for this job, but extreme care must be exercised that panels are not warped and that the sand is completely removed from the entire interior of the car.

Our job is to protect and beautify railroad equipment. We should consider ourselves a branch of the advertising department, for it is our work that catches the public eye and creates a good impression of our individual railroads, as well as the railroad industry as a whole.

The material manufacturers are continually producing better paints. We must be ready to gain experience in the acceptance of these new products, and in new and better methods of application.

The report was signed by Chairman F. W. Vogel, painter foreman, D. & R. G. W., Denver, Col.

Discussion

There was considerable general discussion, mostly about terminal painting, cleaning of air-conditioning ducts and equipment, reflectorized marking and car shopping periods as determined by paint conditions.

Report on Train Yard Operations

Train yard operations so far as they apply to car department activities consist mainly of inspection and conditioning of freight and passenger equipment for movement over the railroads. It is, therefore, essential that employees properly trained and of sufficient knowledge of the operations perform the necessary functions.

The first consideration is proper supervision. A supervisor in charge of train yards should be carefully selected for the work that will come under his jurisdiction and he should be a man who can teach others the proper way to perform duties assigned them. It is more necessary in these modern times that some suitable training schedule be set up on 'Human Relations" for the supervisor. We understand this is in effect on a good many railroads now.

Next, employees such as car inspectors, air brakemen, light repairmen, oilers, car cleaners, classification men, etc., should be schooled as much as possible on the different parts of the operations they are called upon to handle. These people should be familiar with all the rules, pamphlets, circulars pertaining to their work, and the foremen or other supervisors or officials should make occasional checks to see that the rules, etc., are being complied with. In addition, we cannot impress upon all concerned too forcibly the absolute necessity of compliance with safety rules; officers should make surprise checks periodically to see that these rules are being complied with, as safety of employees is the first consideration in Train Yard Operations.

Weatherproof Supply Containers

Proper tools should be furnished and kept in good repair. It is also essential that weatherproof yard supply containers with material be placed in sufficient easily accessible points in the train yard so light or running repairs can be made without delay. Air brake plants of suitable installation should be placed in train yards so air brakes can be tested, repairs made, etc., in advance of leaving time of the train.

Inspection should be made whenever possible on industry tracks, cleaning tracks, freight houses, team tracks, to eliminate bad order cars getting into trains, with resulting delay. Also careful inbound inspection should be made on arrival of trains or transfers to reduce all possible work to be performed on trains after they are made up for outbound movement. Whenever practicable, car inspectors should station themselves on each side of a train arriving at a terminal and a good "rolling" inspection be made to discover dragging equipment, flat wheels, out of round wheels, etc.—defects that are difficult to discover when cars are standing still. Many serious derailments have occurred due to broken truck sides and bolsters; therefore, careful inspection should be made of them for progressive fractures, etc. All running gear is subject to heavy use and constant vibration; therefore, it must be inspected closely. Draft gears, couplers, sills, safety appliances, car doors, etc., are also subject to becoming defective in train and switching operations and must be closely inspected and defects corrected.

Train yard operations also include interchange inspection. Cars interchanged from one road to another must be given a careful inspection and all handling line defects either corrected or properly defect carded and all other provisions outlined in the AAR Rules for interchange of traffic must be observed. In this manner proper responsibility can be placed on the railroad which subjected a car to unfair usage.

Journal Box Inspection

Before trains leave the terminals, a careful inspection and servicing must be given to all journal boxes and contained parts, proper adjustment of packing must be made, and at designated points free oil must be added to the boxes when needed. The procedure to follow differs as to different terminals and instructions in effect on the different roads. However, we urgently recommend that all the provisions of the AAR Lubrication Manual be complied with, as the data contained in this manual is a result of careful study over a long period, and a much better hot box performance will be obtained by employees being made familiar with and required to comply with the instructions contained therein.

After trains are made up, a careful inspection should be made of the air brakes, leakage reduced to the minimum and piston travel adjusted to comply with the rules. Any defective air brakes should be repaired or set out of train. It is desirable to make an inbound inspection as far as possible to avoid delay to outbound trains caused by defective air brakes being repaired, or cars being set out of train. It is also desirable to make a complete air brake test on an outbound train with a yard test plant in advance of the locomotive being placed on train, thereby reducing delay. But, however handled, air brakes should be placed in proper condition before train is allowed to operate over the railroad, thereby reducing accident hazard and helping to make better train handling.

In some large terminals, to expedite oiling of journal boxes, one or more suitable tanks are placed in the ground or above at proper locations, then oil lines running laterally across the track at every 1,000 feet, with a ground box between each track frequently used to make up outbound trains. This provides oil for the oilers without the necessity of crossing through cuts of cars to refill their cans and in addition, this expedites the work of oiling trains and in some cases with less manpower. A better job is also the result, as oilers have a ready supply on hand at all times; therefore, are not tempted to stretch out their oil.

Inbound inspection is the most important, as the most costly delays are those of switching cars out of outbound trains, especially if they carry an originating load. Therefore, we should concentrate on inbound inspection in regular train yard operations, also in hump yards, etc. This in itself is quite a saving in train time and switching operations, to say nothing of unwarranted delays to loads.

After a train leaves an originating terminal and has had proper inspection and servicing there should not be any reason why schedules cannot be met, and it should not be necessary to inspect this train every hundred miles or so. However, "fills" or pick-ups at the small terminals should be thoroughly handled, the same as at originating terminals.

Walkie-Talkies for Car Inspectors

Members should explore the idea of Walkie-Talkie radios for car inspectors. These instruments are now being given a test under operating conditions in some large train yards. The instrument is a "Doolittle" Radio Pack set Type PG-Z-12 on 161.67 megacycle frequency weighing approximately 9 lbs. each, and are designed to operate on horizon range but under actual operation account steel cars, etc., in yards, range is now limited to approximately 1½ to 2 miles, but this can be corrected for operations over longer distances by electric relay stations to assist in pack to pack conversation. By use of this device car inspectors can be in constant touch with each other and also with their foreman and yardmaster. This will go a long way toward speeding up train yard operations.

The yardmaster and other operating department supervisors in train yards responsible for the on-time dispatchment of trains too often overlook the responsibilities of the car department em-

ployees who must know that the equipment is in a suitable, satisfactory and safe condition to move over the next division without accident or delay. In their zeal to maintain an on-time performance, especially when trains are made up late, the transportation department may endeavor to have the inspection, lubrication and testing of trains performed more rapidly than actually required to perform the several operations in a complete and satisfactory manner. Obviously the inspectors must be given sufficient time to do their work and if, by pressure from other sources, they are induced to release a train as being properly and completely inspected before it is ready, delays, accidents and improper train performance can be expected. It is incumbent upon the car department supervision that they insist on having sufficient time and opportunity to insure that the workmen under their jurisdiction can do their work properly and in a satisfactory manner and they should resist the pressure from other sources that may deter them from this objective.

The report was signed by Chairman W. B. Medill, master car repairer, Southern Pacific, Sacramento, Cal.

Discussion

Chairman Medill, in opening the discussion, urged members to explore fully the possible advantages of Walkie-Talkies as an aid to car supervisors and inspectors in train yard operation, explaining how much time and walking they save and how they permit cutting a bad-order car out of a train of 100 cars, for example, in possibly 15 minutes. He maintained that since trains normally spend as much time at terminal yards as on the road, there would be ample opportunity for adequate inspection, if the time could be suitably allocated. He said rolling inspections are a partial answer and cutting out intermediate terminals another constructive move.

H. L. Price, mechanical assistant, Santa Fe, emphasized personnel problems in train yards; said open-top loads are still giving trouble on account of improper bracing; suggested that portable two-way radio communication is especially valuable in coach yards as well as freight yards; cited the value of inspection pits for running inspection of freight trains and underneath inspection of passenger cars in coach yards.

P. J. Hogan, New Haven, said the mechanical department should stand on its own feet and hold trains until necessary work is done, as it is better to delay trains in yards than to let them get out on the main line where a failure could tie up the railroad.

John Likarish, G. N., referred especially to the problem of infestation and pointed out how important it is to correct this condition in all cars offered for grain loading. He said the danger of placing contaminated cars for loading and subsequent heavy damage claims is more serious than commonly realized and urged every road to make just a little extra effort by closer inspection and attention to this important detail.

Report on Car Lubrication

During the past several years there has been a noticeable decrease in the car miles per hot box on freight train cars. Furthermore, the performance of the journal box lubrication by the waste packing method is not satisfactory and acceptable to railroad management.

An important issue must be settled before the problem of proper freight car journal lubrication can be progressed any further with any degree of success. That problem is the present A.A.R. recommended car oil, effective January 1, 1951. We seem to be miles apart on this issue. Some say it is no good and the results obtained very disappointing. It appears to be no better than we have had for years, although acknowledged that some additives were added to offset some of the inherent basic faults. Others again feel that the present specified oil is satisfactory and doing a good job.

All cannot be right and, as reported and suggested to this body last year, we believe the issue must be settled by engineers qualified to study and analyze the operation, lubrication, service, engineering, etc., and then write an oil and waste specification based on what is actually required regardless of cost.

Hot boxes cannot be stopped unless we are willing to spend some money, which railway managements will authorize if we can assure them that if given the tools we can control them.

The present specification oil is temporary. It is a step in the right direction and we think the A.A.R. Research Bureau will continue to work to the end that a better oil will be developed.

Your committee does not endeavor to pose as an oil expert, speaking in terms of oil laboratory language, but we believe a car oil is needed which meets the following conditions:

(1) An all-season oil. It is not practical to have seasonal oils, in view of the general interchange of cars to all parts of the country. Oils must maintain full fluid film lubrication and support load at relatively high temperatures. They must not rupture under heavy loads and high ambient temperatures.

(2) An oil that will feed readily through the waste packing and reduce inherent friction between the car journal and packing to a minimum, regardless of outside temperature, and one that will not congeal and cause excessive rolling of packing in low-temperatures.

Equally important is the quality of the journal-box packing waste. We feel that waste furnished by all railroads, etc., must meet the following conditions:

(A) Waste threads, or combination thereof, must be able to feed oil to the journal in excess of that necessary to support full fluid film lubrication.

(B) No artificial fibers that, because of their extreme fineness are readily carried on the journal, should be used.

(C) The degree of machining and uniformity of material is essential. Elimination of short ends and lint is necessary.

(D) Waste must withstand renovation with minimum of loss.

The bearing manufacturer has made some progress in producing a better bearing, but we still have too many hot boxes caused by slipped or loose linings. We should provide close and individual inspection of all bearings purchased. If too many defects are found, the entire lot should be rejected.

We recommend the bearing manufacturer again be required to cast the railroad's or purchaser's initials in all bearings to be used under interchange equipment. We believe this will offer an inducement to the manufacturer to produce a better bearing. It would also produce a better inspection on the part of the railroad.

Rule 66 should authorize the removal or scrapping of journal bearings when found with cracked linings, as cracks allow oil to seep between the bearing back and the babbitt, thus destroying the bond and resulting in additional slipped linings.

A great number of hot boxes are due to heat at end of bearing, caused by collar wear, due to rough axle collars. A survey of bearings removed at repack shows 33% removed for end wear. It appears the inside of the collar must be finished same as the journal.

Total Damages Large

Losses due to broken journals and overheatings are too hight. In last year's report the total damage was reported in round figures as follows: 1948—$1,754,000; 1949—$2,292,062; 1950—$2,701,000; 1951—$4,137,339. None of the aforementioned figures cover damage to lading, personal injuries, nor do they include any failure where damage is under $300. These are I.C.C. Bureau of Transport Economics and Statistics Code 2420, Journals Broken, Overheating.

Last year we called your attention to apparent lack of ability on the part of our train yard supervision to properly educate oilers and inspectors in performing their duties in connection with service treating journal boxes. A survey has disclosed a particularly disturbing situation. This was the fact that a very considerable number of carmen appeared to be incompletely familiar with the details of the proper method of packing a journal box and the proper oil saturation level.

Each car foreman should spend some time each week demonstrating to his car inspectors and oilers, the proper method of packing and servicing journal boxes. This is particularly important in the case of men working on night shifts, since the survey indicated a large percentage of night shift men improperly instructed and displaying indifference to the proper methods of maintenance and inspection.

Periodic instructional reviews, spot on-the-job inspections and, above all, education in the importance of adherence to proper methods and the difficulties attendant upon sloppy work will all contribute to ensuring that attention to maintenance standards, once instilled, is kept up to the mark.

Your committee has attempted to bring out some of the items that can effect a definite improvement in the hot box freight car delay performance, but it also recognizes that there are many other items that contribute to a better performance, which, for lack of time, have not been touched upon in this report.

In view of present operating requirement of freight trains, have we come to the crossroad where we must admit that the means of satisfactory lubrication of the solid bearings by means of waste packed boxes is no longer possible? Is it true that the railroads and their suppliers have spent millions of dollars for development of better and more efficient equipment, motive power and cars, track equipment, yet the hot box is still almost as critical a problem as it was a half century ago?

Hot Box Control?

Many railroad officers maintain, and justifiably so, that they can control the hot box problem by assigning enough men to inspect, maintain and service the journals of all freight cars at all important terminals through which the train passes and, of course, allowing sufficient time for such forces to properly perform the work. But where is one going to expect to get enough men or payroll to do that kind of a job?

There has been a trend by some railroads to equip freight cars with roller bearing assemblies; namely, cars generally assigned to traffic on its own particular line for obvious reasons. There is no question that such applications are beneficial and will improve freight train operation, but to apply such assemblies to all freight cars in the country becomes a costly undertaking. However, there are devices now available that eliminate the use of packing waste or pads in journal boxes. Your committee feels that these devices should be explored and followed up; some might be what we have been looking for all these years.

If we are to basically improve hot box performance, some good hard work is necessary. Car men must first of all understand that the principles of the A.A.R. rules and instructions governing the service treatment and repacking of journal boxes must be complied with as a minimum, and if we conscientiously use these rules as a minimum we are sure results will be satisfactory. We cannot expect a decent operation unless we put forth the required effort.

(The report was presented by Chairman K. H. Carpenter, superintendent, car department, D. L. & W., Scranton, Pa.)

Discussion

W. M. Keller, A.A.R., said plain bearing journals will be in railroad service a long time and the problem of hot box reduction must be approached from every logical angle. He indicated that oil is important and further improvements are pending, but without good mechanical conditions, journals will continue to get hot. He said railroads can spend a lot of money for improved waste and yet still experience trouble on account of waste grabs. With better maintenance through efforts of the C.D.O.A. and more edequate lubricating material standards, as set up by laboratory technicians, he said he hopes 1952 will be the turning point in hot box troubles.

G. R. Anderson, C. & N. W., said speed is "of the essence," since hot boxes are now seriously interfering with freight movement. He referred to favorable experience on the North Western with low-viscosity oil in a hoppr car test which showed 30 deg. F. lower journal operating temperatures. He mentioned hot box trouble on stock cars running out of Omaha which was stopped by applying packing retainers to prevent packing rolling and waste grabs.

Another point stressed by Mr. Anderson was that some delays charged to hot boxes are due to other causes, as for example, brine dripping into refrigerator car journal boxes, or worn lugs causing loose covers. He said the Empire roller-type lubricator has been giving satisfactory service with tight covers and dust guards on C. & N. W. equipment for two or three years. He believes railroads must clear up the question of oil and in the meantime concentrate on service attention to journal boxes in train yards where more time is urgently required to inspect long trains.

R. E. Coughlan, chairman A.A.R. committee and engineer of tests, C. & N. W., said the present oil specification works well on some roads and not on others. He expects an improved oil will be available before too long and will produce desired results provided journal box conditions are properly maintained.

F. B. Rykoskey, B. & O., said that in the last analysis, every failure is a man failure; that humping has a lot to do with hot boxes, also slack as it runs in and out; that heavy loaded coal and ore cars are being run too fast; and the quality of car inspection work must be stepped up to minimize bearing failures.

E. E. Packard, S. P., asked if present requirements of the lubrication manual are being lived up to, as linings are not being hooked in many instances to dectect incipient waste grabs, and this practice, when put in effect in Los Angeles yards, reduced hot boxes 50 per cent.

In this connection, P. J. Hogan, New Haven, said it is essential to use a flash light much of the time when hooking journals to find waste grabs and see bad linings at the back of journal boxes.

S. H. Keys, B. & O., referred to seven hot boxes in a 24-hr. period and said the operating vice-president wanted to know why they had to happen on the seven best trains! He claimed that faster acceleration with diesel power is a factor, also heavy loads which increase unit bearing pressures. Mr. Keys said that Flex-Pak type lubrication (recently changed in name to Ply-Pak) has done a good job in two years' test service on the B. & O. He doesn't know if it is the answer, but stated that test runs have been made up to 15 months without glazing or other difficulty. Empire roller-type lubricators also are promising but need a tight oil seal, according to Mr. Keys, who said the B. & O. has 200 Hennessy lubricators in test service and 25 to 50 per cent of passenger cars equipped with roller bearings which give good results with proper attention. He said, "One thing is sure, we must find some way to stop hot boxes."

Report on A.A.R. Loading Rules

The matter of obtaining full compliance with the provisions of the loading rules presents certain problems that are peculiar to each individual carrier, though in general most of the problems that are experienced by any one carrier are common to all carriers. Thus, in our endeavor to see that shippers comply with provisions of the applicable rules, we are all confronted with the same difficulties.

Violations consist primarily of failure to apply lock nuts or nick the threads on bolts or tie rods, as mentioned as cause of train wreck, omission of, or improper tie band and wire protection on sharp edges of *lading* and car parts, the use of blocking, bracing, bearing pieces, etc., having dimensions less than the specified requirements, the substitution of soft lumber in cases where the rules specify the use of hard wood.

Generally speaking, we find that shippers, if properly approached are very cooperative in complying with the loading rule requirements and in cases involving the loading of a commodity, the securement and blocking of which is not specifically covered by the rules, it is the obligation of the originating carrier to instruct these shippers by a competent car department employee.

One of the most frequent serious violations of rules appears to exist on such commodities as scrap iron, scrap tin plate, metal boring, etc. fully covered by Fig. 84 in Pamphlet MD-1.

Violations mainly consist of failure to apply required side protection or no securement when loaded above sides of cars, and investigation too often develops that such loads are originated by the carriers themselves.

In a recent check made by one of the eastern railroads, it was found that 55 cars were shopped at one terminal for a period of one month to rearrange and adjust scrap metal which had originally been accepted from shippers, loaded in violation of the requirements of Fig. 84, as shown in Pamphlet MD-1.

If we analyze all the conditions that contribute to the disarrangement, shifting and damage of loads, we will find that there are three main contributing causes: (1) failure to comply with the published loading rules; (2) improper car handling in yards and on the road; (3) to a lesser extent, the inadequacy of some of the loading rules. Educating those concerned in the mechanical and operating departments would certainly lessen our difficulties.

Your committee believes shippers should regularly check banding and wire-tying machines to be sure they are in good condition and not worn to the extent of not making a proper seal or tie, as there have been cases of bands slipping in the seals and becoming loose in transit. Shippers should be informed of the

revision of general rule 15, which now requires that: Where high tension bands or wires are attached to stake pockets, they must be machine tensioned, sealed, or twist tied at least 18 in. above stake pocket.

The committee recommends that in Pamphlet MD-2 there be included a list of the various high tension bands, wires, bars and plates as shown in other MD pamphlets, particularly MD-1, which will indicate the strength of the various bands, etc., in case they are used in place of rods or bolts.

Proposed changes in Pamphlet MD-3

Figs. 6, 7 & 8: Recommend that minimum length loaded on one side of any pile be reduced to 10 ft. instead of 12 ft., as now specified.

Reason: It has been brought to the attention of this committee that railroads, principally in the South and Southwest regions, are losing business to the trucks due to Figs. 6, 7, and 8, of pamphlet MD-3 confining outside lumber lengths to 12 ft. minimum.

Fig. 14, Item B: Number of pieces, to read a minimum of 6, each side of load.

Reason: To reduce space between stakes to prevent spreading, or prevent any portion of load from moving beyond sides of cars, as provided for in Item E.

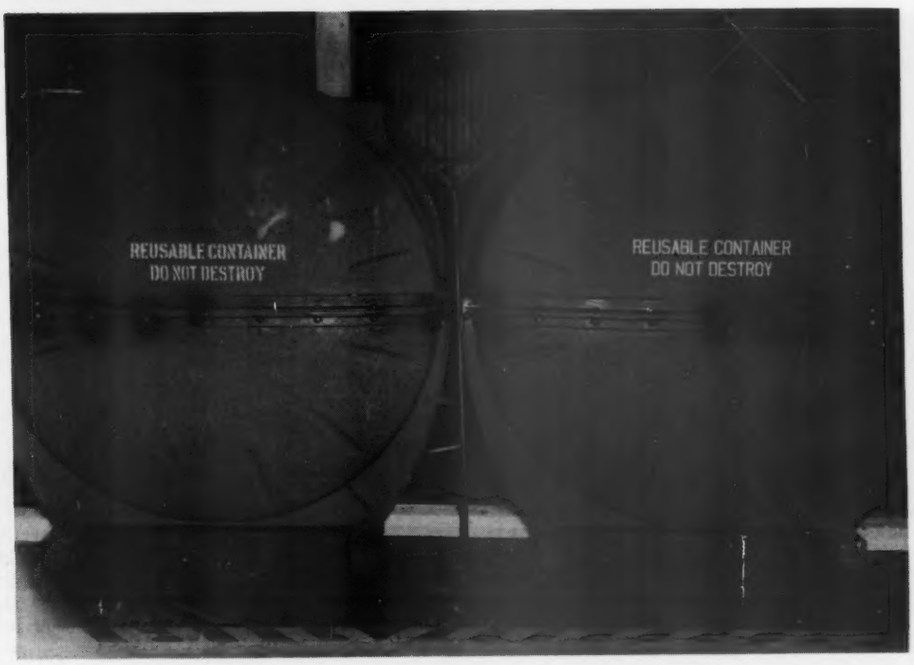
Fig. 14, Item C: To be applied with butts alternating.

Reason: To prevent loosening of side mesh and obtain a more solid end wall.

Fig. 14: Recommended that heading be reworded to include unpeeled pulpwood by omitting the word, "peeled" therefrom.

Reason: Due to difficulties being experienced with unpeeled pulpwood and no figure to cover.

Method of loading and blocking airplane engine container on flat car.



Ends of container showing intermediate blocking and the tie rods.

Proposed alternate of loading marine buoys — 25 carloads shipped safely.

Fig. 17: Recommended that new item be included to provide for application of three 2 in .505 HT encircling bands equally spaced insofar as entirely creosoted poles are concerned.

Reason: To provide the additional securement required necessary to prevent longitudinal shifting and reduce stake breakage.

Fig. 18: Recommend same recommendation as for Fig. 17, as this is entirely a creosoted pole load.

Fig. 19: Recommend item G be reworded as follows: 3 per pile 2 in. by .050 in. bands equally spaced between items E.

Reason: Securement as presently provided for, inadequate to provide required protection.

Fig. 24: When item C is required to obtain clearance over idler, then rule should be changed to require similar item C on opposite end.

Reason: To prevent shifting toward non-overhanging end.

MD-4, Fig. 9, Item E: Recommend the wording "with 2 seals each" be eliminated.

Reason: General Rule 15, Sec. B, Par. 8 covers.

MD-5, Page 25: Recommend that sketches covering the arrangement of load on 2 or 3 cars per tables 3 to 35 inclusive, be revised to include a sketch covering a car with a single or double overhang load. This revision also to specify that overhang measurements in all cases be taken from centerline of truck.

Reason: No sketch now shown of a car with an overhang on one or both ends and to conform with General Rule 16, Par. B.

MD-5, Item F. Fig. 44: Specifies the thickness of hot rolled steel and other similar securements to be ascertained by the use of the BW gage. Inasmuch as this BW gage is not generally understood by car inspectors and no car inspectors, to the knowledge of this committee, are furnished this BW gage, we recommend that the item BW gage be entirely deleted from all the figures in the Loading Rules and in lieu thereof the thickness of the metal be shown in fractions of inches, except in cases where use of tie bands are permissible, thickness of same to be shown in decimal of inches. We alsoo recommend that consideration be given to substitute Wrot steel strapping, high tension steel bands, etc., for hot rolled steel, etc., of equivalent load strength.

MD-6, Fig. 54: Recommend revision to place a limitation on portion of tires that may extend beyond car floor.

Reason: To insure adequate bearing on car floor and thus provide safer load.

MD-6, Fig. 3: Recommend that the loading of four and six-wheel motor graders (with pneumatic tires) lengthwise on flat cars, be revised to include tie down securements.

Reason: Figs. 24, 25, 29 and 30, of MD-6, now provide for tie downs to similar motor graders and Fig. 3 should have similar tie downs as a matter of additional protection.

It has been brought to the attention of this committee that the New Haven has experienced some difficulty with a manufacturer of marine buoys to load this product strictly in accordance with Fig. P, Special Supplement #2, and especially is taking exception to applying the cradles and otoher intermediate blocking. This manufacturer in conjunction with the New Haven has developed a method of securing this lading without the use of said cradles and intermediate blocking, as per following photo furnished the railroad. As of date, in excess of 25 car loads have been shipped loaded, as per method illustrated, without any known difficulty. As a matter of additional information, the US Navy, who are consignees, are in favor. In view of this information, your committee feels that consideration should be given to adopting this method of securement as an alternate method to Fig. P of Special Supplement 2.

Airplane engines, including jet engines, in containers: Due to increase in shipping airplane engines in containers on open top cars, this committee feels that there is an urgent need for immediate developments of specifications to govern loading and securements, as illustrated, and recommend the AAR Loading Rules Committee give this prompt consideration.

(The report was presented by Chairman A. C. Bender joint supervisor of car inspection, Cleveland Car Inspection Association.)

Discussion

L. T. Donovan, A.A.R., told the members about an educational program initiated late in 1950 whereby representatives of the A.A.R. conducted, under sponsorship of U. S. Department of Defense, Joint seminars on "Loading and Bracing Methods" for military and civilian personnel of the army, navy and air force at six centrally-located points throughout the country. Visual aids used in this work, which received the personal commendation of General George C. Marshall, then secretary of defense, were shown in the form of color slides by three representatives of the A.A.R.: E. J. League, Bureau of Explosives; Burton Williams, Freight Loading and Container Bureau; and J. H. Campbell, Mechanical Division. The concensus of these men was that visual aids should be utilized to the fullest possible extent in an organized effort to give both shippers and car inspectors a better understanding of the best modern loading methods for all types of commodities.

(The report was accepted and recommendations ordered referred to the A.A.R. for approval before becoming effective.—Editor.)

Report on Air-Conditioning Equipment

As any passenger car air-conditioning system depends on electric power, it is necessary that the power supply be given proper maintenance attention. A thorough understanding of the entire car electrical and air conditioning system is important to obtain satisfactory operation resulting in a minimum of air conditioning and electrical equipment failures, to insure maximum comfort to passengers.

It is the purpose of this presentation to survey the basic maintenance problems of the car electrical system.

The source of electric power is the generator, which may be driven from the axle by belts, gears, a combination of both, or directly from an engine. The power supplied by the generator usually charges a battery and furnishes necessary electrical power to the balance of the electrical system and is controlled by various types of regulating equipment.

The committee realizes that any part of the car electrical system would develop into a lengthy report. They are of the opinion that a series of slides with sound recording will offer a much more interesting presentation; therefore, the various subjects, such as the drive equipment, generators and generator regulators, will be presented in this manner. There are several types and makes of drive and generator equipment, and it is not the intent of the committee to recommend any make or type of power supply system.

The Safety Car Heating and Lighting Company has offered the use of their facilities covering maintenance of Spicer gear drive and generator equipment. (At the request of the committee chairman, H. S. Clark, Safety Car Heating and Lighting Company, presented two instructive color films depicting approved practices in maintaining Spicer drives, Safety generators and generator regulators.)

(The report was submitted by Chairman R. F. Daugherty, general electrical and air-conditioning inspector, Union Pacific, Omaha, Neb.)

Discussion

One member asked about oil leaks at the quill seat of Spicer drives, and it was explained that the quill felt is a dust shield to keep out dust and water, rather than an oil seal. Mr. Lewis said that lubricant is used for cooling as well as to lubricate Spicer drives and that improvements in the present construction give four times the mileage of early designs.

In response to questions, Chairman Daugherty said that this type of mechanical drive to generators is not likely to cause vibration in car floors because the gear drive is rubber mounted on the axle, but held to the close tolerance of .020 in. concentricity. Periodic visual inspection of the drive, torque arm and lubricant are made on the U. P. and the clutch is removed once a year.

Interchange and Billing for Car Repairs

During the past year your committee has considered proposed revision of the present Code of A.A.R. Interchange Rules, and submits the following recommendations for approval and subsequent submission to the A.A.R.*:

Rule 2, Par 2, Sec (b)

Proposed Form: Cars containing flammable or other liquid classified as dangerous which are leaking must be repaired or transferred, without any unnecessary movement or at nearest available point. *Where privately owned cars loaded with hazardous materials are leaking or wrecked, it may be desirable to promptly contact the car owner (or shipper) to obtain information as to proper and safe procedure.*

Reason: Such action is now taken in many instances, and if generally followed could aid in avoiding personal injury and property damage.

* The committee's comments about Rules 9, 23, 95, 101 and 108 are omitted from this abstract of the report for the most part on account of being covered in Supplement 1 or simply requesting rule clarification. None of the changes suggested are effective until approved by the A.A.R.

Rule No. 10

Proposed Form: In noting the cause of removal of wheels and axles, the terms shown in Rules 68 to 86, inclusive, *or* A.A.R. Recommended Practice symbols for marking defective wheels, shown on pages 173, 174, and 175, *shall be used.* These symbols *or the the terms shown in Rules 68 to 86* may be used on the Billing Repair Cards. However, omission of *one or the other of these,* either symbols *or terms,* from the billing records will not justify exceptions to charges.

Reason: To reduce and simplify billing repair cards.

Rule No. 17

Proposed Form: Note 9.—Former A.A.R. Standard No. 15, beams are permissible substitutes for hangerless type beams A.A.R. No. 3 or A.A.R Standard No 18 hanger type brake providing truck sides have brake hanger brackets cast integral therewith, except when the hangerless type beam removed is A.A.R. Standard No. 18, the hanger type beam substituted must be A.A.R. Standard No. 18. However, in cases of handling line responsibility *where former A.A.R. Standard 15 or A.A.R. No 3 brake beams are applied,* defect card should be issued for labor and material

Reason: To clarify the intent that provision with respect to issuance of defect card does not apply where hanger type beam is A.A.R. Standard No. 18.

Proposed Form: (q) Axles: A.A.R. Standard or A.A.R. Alternate Standard tubular type, of same capacity, may be substituted for each other as correct repairs, charges and credits to be on basis of material applied and removed *versus car owner regardless of responsibility for repairs.*

Reason: To clairfy the intent that car owner should be charged for difference in value where tubular axle is applied in place of solid type, or receive credit where solid type is applied in place of tubular axle, regardless of responsibility for repairs.

Rule No. 23.

Proposed Form: Add to Sec. B.—Running boards, metal—welding of cracks of fractures permitted.

Reason: Metal running boards are being scrapped when found with small fractures and as this is not economical and as welding of fractures has been determined as being satisfactory, rule should permit welding of metal running boards. See DV-1179 which was approved by letter ballot but as yet Rule 23 has not been changed.

Rule No. 44

Proposed Form: Sec. (1) All-steel underframe cars having two or more longitudinal sills: when center sills are abruptly bent in excess of 2½ in. *(1½ in. for center sills of A.A.R. Standard Z-Section construction),* vertically or horizontally, within a space of 6 feet between inside edges of body bolsters.

Reason: Unquestionably, there has been a decided increase recently (within the last several years) in the rough handling of car equipment. This increase in rough handling manifests itself, principally, in a considerable increase in the number of cars admittedly damaged in unfair usage, including Rule 44 cases.

Appearing among the bent center sill cases are comparatively new cars having the stronger A.A.R. Standard Z-Section center sill construction. Due to their stronger construction it obviously follows that such cars will stand a much greater blow in impact than the others and, therefore, as a matter of equity, this fact should be taken into consideration and the suggested addition to the rule be adopted, in order to provide a greater measure of protection for those cars.

Rule No. 60

Proposed Form: (Note on page 137) Stencil on either side or either end of the reservoir presenting clearest view from outside of car *or on hopper car on sub-side sill near release rod.*

Reason: Where construction of car will permit, stenciling located on sub-side sill remains legible a considerably longer time than when located on reservoir. Many roads are now doing this, but strict compliance with Sec. (f) does not permit stenciling in this location.

Rule No. 60-A

Proposed Form: When car is on repair track for any purpose and the stencilled air brake markings show same "In date" the air brake mechanism must be tested as required by the standard instructions for maintenance of brake and train signal equipment, rules 101-102, including code of tests as prescribed in air brake instruction pamphlet No. 5039.4 Sup. No. 1 dated 1-1950, for which charge will be permitted as per rule 111, item No.——.

Purpose for which car was shopped must be shown on billing repair card. The hand brake mechanism must also be inspected, tested and lubricated as required by the standard instructions for maintenance of brake and train signal rule 103.

Reason: To encourage compliance with the above rules.

Rule No. 66

Proposed Form: 7. When wheels and axles are changed.

Reason: It is the intent of the rules and the Lubrication Manual that secondhand or used brass be not returned or applied to any journal other than that from which it was removed.

Rule No. 82

Proposed Form: (Omit note after Par. (1): the remount gage must not be used in connection with reclaimed one-wear wrought steel wheels marked "1-WT."

Reason: To permit condemnation of 1-W Steel Wheels under all conditions.

Rule No. 91

Proposed Form: (8) *Q.—What is to be considered "date bill is passed for payment," per sections (b) and (c), on bills paid by draft under A.A.R. Disbursement Rule 23?*

A.—Date draft is drawn as stamped on bills.

Reason: To clarify. Some roads claim date such bills are passed for payment is date draft is drawn in payment thereof, others claim that this means date voucher is issued to cover which in some cases may be two or more months after date of draft.

Rule No 107

Proposed Form: Item 56, Note—This charge is not permissible on empty refrigerator cars equipped with hinged type doors.

Reason: Provisions of this Note apply when such doors are replaced per Item 57 and should also apply when hinged type refrigerator car doors are R&R as securement basis covers.

Proposed Form: Items 195, 196, 197, 198. (*No change—add note to apply to each item.*) Note—*When authorized by car owner—see Rule 16.*

Reason: To comply with provisions of Rule 16 and to avoid possible personal injury or property damage which can result from improper procedures with cars handling hazardous materials.

Rule No. 108

Proposed Form: Eliminate Item (a) (4) Brakes, tested and adjusted.

Reason: Account proposed changes in new Rule 60-A and Rule 111.

Rule No. 111

Proposed Form: Item 5. Cylinder-release springs, cylinder piston and rod or cylinder non-pressure head, any or all, R. & R. or R., when not in connection with Items 13 and 14. (*15 and 15-A eliminated.)*

Reason: It would appear that reference to Item 15 and 15-A could be eliminated from above rule, as these two items only refer to AB type work and is covered in Item 21 of the same Rule.

Proposed Form: Establish price for making "In date" test of air brakes, including testing of hand brakes.

Reason: Cost of doing this work on present types of brakes justifies charge for same.

Rule No. 120

Proposed Form: Sec. C, Repair limits for labor on car body should be increased.

Reason: It is obvious that the repair limits specified for labor allowances shown on page 271, Rule 120, should be increased due to recent increases in labor. It has been some time since these allowances have been revised; therefore, it is recommended they be increased to compensate for labor increases.

At the present in making repairs, especially to 50 foot flat car floors, the specified allowance is very often exceeded, and when repair cards are checked by the owner, it becomes necessary to furnish C. B. A.

Rule 120—Par. E

Proposed Form: Last paragraph. In the latter case the owne shall pay $60.00 for the cost of loading and *shall assume all freight charges;* also, the cost of unloading.

Reason: Under the present Rule *handling line* has to assume transportation charges over its line. Rule 120 cars are generally worn out cars—owners defects. If the owner desires the car sent home loaded on another car, instead of authorizing dismantling, the owner should assume all transportation charges, as he derives benefit from usable second-hand material recovered from car.

P. C. Rule No. 7.

Proposed Form: Par. (e) (1) The wording "Axles standard to car must be maintained," should be deleted from this rule thereby allowing repairing line to charge for applying on A.A.R. standard axle. There are cars having axles with 5½ x 11 inch journals in interchange service and by above wording, owner gets full protection for a Non-AAR axle; something that is not done in any other AAR rules.

Proposed Form: Sec (e) Par. 4, In the substitution of wheels and axles equipped with A.A.R. friction bearing units for wheels and axles equipped with roller bearing units, the principal outlined in Interpretation M-11, Rule 17, Freight Car Code of Rules will govern.

Reason: To clarify the intent and to harmonize with Freight Code.

P. C. Rule No. 22.

Proposed Form: Note 2, Par 2, Non-AAR axles having 5½ in. by 11 in. journals shall be charged and credited on basis of *scrap value* per Item 199 of Freight Rule 101.

Reason: It is unfair to make repairing line allow a credit for a non-AAR axle with 5½ in. by 11 in. journal on basis of an A.A.R. axle with 6 in. by 11 in. journal.

In its report this year the committee gave first consideration to those recommended changes which would effect a further clarification and simplification of the rules, with the thought in mind of eliminating, where practical, unnecessary detail in preparation of billing repair cards and records in train yards and repair tracks. It would be helpful to future Committees, if more men in the ranks would submit their recommendations and ideas, and with this thought in mind, this Committee recommends that the Question Box be reinstated, as it is felt there are many questions confronting members which never get to the A.A.R. Arbitration Committee for a ruling and such a service by this Association would be of great benefit to the membership.

(The report was presented by Chairman J. J. Sheehan, supervisor or car repair billing, Missouri Pacific.)

Discussion

Objections were raised to proposed changes in Rule 60-A, but on a voice vote the committee was sustained. With reference to P. C. Rule 7, Harry Belond, C. M. St. P. & P., supported the committee's recommendation and asked how a railroad can be rightly penalized for substituting an A.A.R. for a non-A.A.R. axle.

(The report was accepted with recommendations to be formally considered and approved by the A.A.R. before becoming effective.—Editor)

Conditioning Cars for Higher Commodity Classification

A freight car, if it is to carry its load to destination without delay, should be selected, before being placed for loading, by competent inspectors who have a general or thorough knowledge of the type of load which the car is to carry. Cars selected to carry flour, grain, sugar and similar commodities, must have good ends, sides, doors and roofs, to prevent rain, snow or cinders entering the car. Interior of car should be in good condition for the commodity intended to prevent loss or damage to contents.

The time for the preparation of freight cars to meet present day operation is while the car is in the shop or on the repair track. A car that is properly repaired before it is turned out of

the shop should give continuous service, without the necessity of placing it on light repair tracks, until it is due for periodical repacking of the journal boxes or the cleaning of the air brakes. Where it is found necessary to continually bad order a car, progressing it from repair track to repair track, as is too often the case, the trouble can usually be attributed to the failure of each repair track to find and correct the defect or repair all existing defects on the car before releasing it for further service. It is the recommendation of your Committee that closer supervision be given to the work that is being done in our shops and on our repair tracks to improve the condition of freight car equipment, which will greatly reduce the delays on the line of road and keep in service a larger number of freight cars to meet the demands made upon the carriers for sufficient equipment to meet present day operation. Many railroads have adopted programs of improving their freight car equipment when it is in the shop for repairs, which has greatly aided in eliminating delays in transit due to again bad ordering the car for repairs.

When a car is shopped for repairs, all of the work necessary to keep it in service for the highest commodity practical should be performed in the proper manner. Periodical cleaning of the air brakes and repacking of the journal boxes is an important function of the repair forces, to eliminate bad ordering the car after it is loaded, or setting it out of a train enroute due to mechanical failures.

Many delays and accidents have occurred, and are continuing to occur, due to lead, copper bars, steel products and similar commodities breaking through box car floors, which is brought about by concentration of weight on single floor boards or over small areas of the car floor permitting the lading to fall through and onto the right-of-way. This condition is not always brought about by defective equipment, but rather is due to the type of equipment which is selected for this specific type of loading. Only cars having sufficient floor supports, or cars equipped with flooring of sufficient strength should be selected at originating points for loading these materials.

Damage to Box Car Floors

Some damage to box car floors has occurred through failure of shippers or consignee to properly comply with the General Rules covering loading of carload shipments of commodities in closed cars. Circular No. 42-B, effective Sept. 1, 1947, states that the "General Rules" MUST be observed for all closed car loading. General Rule No. 5 (D) specifies that "When lift trucks are used for loading and unloading, suitable steel plates must be placed in car to prevent damage to car floors." The Shipper or Consignee who fails to do this may damage car floors and thus may make them unsuitable for a high class commodity. The cooperation of all concerned should be requested where there is known violations of this kind to prevent a recurrence.

Facilities for cleaning cars should be provided at sufficient designated locations on all railroads to properly care for their requirements and so located to avoid unnecessary movement of cars from one station or terminal to the cleaning track and again be back hauled to the station where cars are to be loaded. In constructing car washing facilities, a good practice is to elevate one rail higher than the other, which will tilt car enough to allow the water to properly drain.

In the removal of small oil or grease spots from car floors, many methods are used, one of which is removing the oil spots with an oxygen-acetylene torch, thoroughly scraping same and brushing out car, when the contamination is not too deep on car floor. Another is the use of floor sealers to cover such spots.

The cleaning of cars for grain and grain products is very important in the control of insect infestation and methods which will remove grain or grain products from car, such as blowing out with compressed air at ninety pounds pressure, or the use of live steam or water are recommended.

Whenever steel sheathed-wood lined box cars are given general repairs or whenever it is necessary to renew the top side lining boards or the corner end lining boards for any reason, application of removable lining boards for cleaning purposes, should be provided for, as shown on Sheet C-62-1947 of AAR Manual of Standard and Recommended Practice.

Also, when box cars are given general repairs to prevent retention of grain in pockets behind side lining, grain release should be provided for as outlined on Sheet L-30-1923 of the AAR Manual of Standard and Recommended Practice.

Contamination of Cars

For many years, the improper use of and damage to the better classes of freight car equipment caused by the loading and transportation of contaminating commodities has reached such a volume that cooperative effort among railroads, and between railroads and shippers is necessary, not only to avoid excessive costs of reconditioning equipment for the original service for which it was intended, but also to avoid depletion of equipment available for high-class loading, as well as damage to various commodities loaded in contaminated cars. Much of this can be avoided by employing regularly assigned cars for Hide Service or Contaminated Products as well as reconditioning of misused cars by cleaning or repairs. With the advent of Rule 32 (12) (a) making the road who furnished the car for such loading responsible for Contamination Damage, there has been some decrease in the number of cars being contaminated and this should be checked closely by the Car Department as well as by the Operating Departments for the selection of proper cars.

Over recent years improvements have been made in freight car equipment many of which have eliminated or reduced interior damage to equipment, such as the application of permanent lading anchors.

However, shippers should be made familiar with the fact that many box cars are equipped with permanent lading anchors, it being noted in some cases when car was equipped with permanent lading anchors at inside lining and specially designed door posts for high tension band securement, but shipper failed either to observe or use same and secured the bands to the lining with temporary band anchors, which in turn caused damage to inside lining.

The cooperation of the Transportation Departments of all railroads is very essential in order that cars carded for higher commodities will not be misused for a lower class commodity, thereby reducing the number of cars in high-commodity service.

Some misuse of equipment is due to cars being unloaded with one type of commodity and reloaded with another without having been reinspected.

Commodity inspection by car inspectors is highly important and at all times car should be commodity carded for its highest commodity, regardless of what it may be used for.

It is also recommended that, at large terminals particularly, every effort be made to select car inspectors specifically trained in the classification of cars, who know the requirements of the various shippers in his territory, so that cars may be distributed more effectively.

Side doors on box cars should be closed and latched at all times after being classified, both as a matter of safety and to keep interior of cars clean and dry.

The cooperation of consignees should also be urgently solicited in the complete unloading of cars released by them for the reason that when cars are released, not properly cleaned or dunnage removed, there is a possibility of car being reloaded without being properly cleaned.

When special orders are placed by the Transportation Department for certain types of equipment for specific loading, Car Department should be advised in all such cases so that only proper equipment will be selected; this may prevent the back haul of cars from points where cars later may be inspected and found unsuitable. Cases are known where other departments have failed to notify the Car Department and no inspection was made of equipment before movement, resulting in unnecessary switching, mileage and per diem.

In our report, we are specifically reporting on the maintenance of box cars for high commodity loading by repairs of parts standard to the car, however, during peak seasons, such as the movement of grain, etc., it is the common practice of most railroads to make many cars temporarily suitable for such loading by the application of suitable liners of various types which are nominal in cost and thus make thousands of cars suitable that may otherwise not have been upgraded. However, many cars, so upgraded temporarily, will not be used by certain shippers, their contention being that the liners (or other temporary methods of coopering cars for grain loading) are apt to cause damage to their equipment when cars are unloaded.

(The report was presented by Chairman T. E. Hart, chief car inspector, New York, Chicago & St. Louis.)

EDITORIALS

Fall Conventions in Retrospect

The Life of the Meeting

The program of the Railway Fuel and Traveling Engineers' Association at the September meeting at Chicago was of high quality. This was as much due to the range and pertinence of the subjects covered as to the quality of the individual reports and papers. But there was one weakness. The number of subjects covered was so large that no time was left for discussion. The one exception was the session at which the Air Brake Association joined with the Railway Fuel and Traveling Engineers' Association to listen to and to discuss a comprehensive report on train handling of equal interest to the members of both bodies. The report was long but it was the only one on the program for that session and there was time for an extensive and spirited discussion. A number of questions pertaining to various features of train handling concerning which some of the audience were seeking light were asked and answered from the floor. There was evident in the tone of the discussion a feeling of satisfaction with the result.

As the annual meeting drew to a close the need for time to discuss all reports, even at the expense of presenting fewer of them, was commented on from the floor and assurances were forthcoming that the program next year would be planned so the members, both those present and those who will later study the proceedings, will not be deprived of the value of the discussion. Some reports are written with the purpose of bringing out discussion and without it the reports themselves are of little value.

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Adaptability Pays Off

Back in 1902 when a small group of boilermakers from the railroad field got together to form what is now the Master Boiler Makers' Association they couldn't even have dreamed that when the organization celebrated its 50th Anniversary, which it has this year, the steam locomotive, even then an "unrefined" type of motive power would be on its way out of the picture. We might say, incidentally, that the use of the term unrefined was an easy way of saying that in 1902 the major refinements that made steam power what it was before the diesel took its place were yet to come.

So, the MBMA, in 1952, found itself in a position of having to celebrate its golden anniversary by starting life all over and one need only glance at the program of the '52 meeting and know a little bit of the background of the committee work of the past two or three years to become immediately conscious of the fact that here is an association that not only has had to make drastic changes to "keep up with the times" but to guarantee its future existence has had to find ways of adapting its work to the needs of a group of people faced with the problem of maintaining an entirely new type of power. As the use of diesels expanded in came problems in welding, of maintaining fuel and water tanks, and a new form of "boiler" in the steam generator. We predict there will be many other things in the days to come where the specialized knowledge of the "boilermaker" will be badly needed.

Adaptability to changing conditions always pays off and the substantial membership increase which the MBMA has experienced this past year is proof that they're on the right track.

It might also be worth while to pause and reflect that an organization is rarely much better than its secretary and, for 22 years, the M.B.M.A. has been fortunate in having one who always has looked ahead.

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Next Year in June

The Electrical Section is now a single body whose function is to develop new information, recommended practices and standards covering electrical equipment for both the Mechanical and Engineering Divisions of the Association of American Railroads. It now employs a full-time secretary and its 1952 reports all appear in one cover. In 1953, it will meet in June, in Atlantic City while the A. A. R. Mechanical Division is in session. This will preclude a joint meeting with the Locomotive Maintenance Officers Association, but this should entail no lack of cooperation. It is extremely difficult to ac-

complish much in so large a joint meeting. The committees of direction or executive committees must assign work to the technical committees, and these assignments should be made so that work is not duplicated by the two bodies. Where there is a mutual interest, effective co-operation can be obtained by extending invitations to the other body to participate in committee work. It is in the committees where most of the work is done. A highly important function of the Electrical Section is to provide information on electrical subjects to other railroad departments. To fulfill its constantly increasing responsibilities, it will obviously be necessary to increase membership, to enlarge committees, and to extend the scope of the Section's work.

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Getting Down to Business

Some indication of the value of the Locomotive Maintenance Officers' Association to the railroad industry is the fact that attendance at the 1952 sessions exceeded those of previous years and its total paid membership at this time has held up to a total where it is still one of the largest, if not the largest, association in the industry.

A year ago, in commenting on last year's meeting, we suggested that the very size of the organization imposed upon it an unusual obligation to broaden its viewpoint and make doubly sure that the work it was doing was of unquestionable value not only to its members but to the industry which they represent. The committee work of the L.M.O.A. has been improving for five or six years and there is indication that it is reaching a point where committee reports no longer represent the opinions of a relatively few railroad men but are an accurate cross-section of the thinking in the industry concerning the subject under discussion. If no other report presented as this year's L.M.O.A. meeting was of value, the survey on diesel facilities (which appeared in our October issue) was a job well done and one which the industry has needed for some time.

Not satisfied with this, however, other reports such as the one on apprentice training and the one on locomotive cleaning are samples of excellent committee work.

An organization as large as the L.M.O.A. has no choice except constantly to improve the quality of its work and its performance in 1952 seems to indicate that it is seriously getting down to business.

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Become Better Salesman

Of all the qualifications for a supervisory job, selling ability ranks among the least necessary in the minds of most supervisors. Yet the ability to sell can be one of the most valuable attributes of any railroad officer, and at the same time enable him better to serve his department and his railroad generally.

So spoke J. W. Hawthorne, general superintendent of motive power and equipment, ACL, in a talk before the Air Brake Association. Too often, Mr. Hawthorne pointed out, the air-brake officer's request for new maintenance facilities or equipment, or for additional men, is turned down because he does not present the advantages of his request in terms that management can understand.

What must be avoided, Mr. Hawthorne continued, is the presentation in highly technical departmental terms. Instead, the departmental supervisor should phrase his request in terms of the dollars it will save, or how it will aid in avoiding delays and getting trains over the road better, always using language clear to the management man who has no detailed knowledge of air-brake equipment.

Certainly nobody could have attended this year's air brake meeting without returning to his job with ammunition to help him sell his management on needed improvements for the air-brake department. Roughly half the papers dealt with problems having a direct bearing on overall railroad operation, or at least on overall mechanical-department operation—two on leakage, what it does, how it affects train handling, how to measure and correct it; one on the release control retainer as a means of better braking; and one on standardization of locomotive air brake equipment. The remainder bore perhaps only indirectly on overall operation, but still contained a wealth of good information to help the air-brake man not only in his own departmental work, but through bettering his department's operation, to contribute more effectively to the running of his railroad.

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Car Men Discuss Hot Boxes

No group of railway car men can get together today without starting some discussion of hot boxes, and the 12th annual meeting of the C.D.O.A. at Chicago in September was no exception. As reported elsewhere in this issue, a well-rounded program of addresses and committee reports on other subjects was presented, but the report on car lubrication was the one which seemed to develop the greatest diversity of opinion and comment.

As a matter of fact, the discussers of this particular subject included one railroad president, one research director, one engineer of tests, one superintendent of motive power, four car-department heads, two master car repairers and one general supervisor of car inspection and maintenance. And what did these men have to say about hot boxes?

Obviously, they didn't *solve* the problem, which is essentially unsolvable, inasmuch as it will never be possible to eliminate bearing failures entirely, regardless of what type of bearing is used and how thoroughly bearings are guarded in operation. The urgency of the need for improving present bad conditions was strongly emphasized, however, and most of the remedies quite thoroughly discussed, pro and con.

The case was well summed up by Ward Messimer, C.D.O.A. president and this year's presiding officer, who said railway executives have challenged the association to fight hot boxes at the last three annual meetings and

"Present reports indicate we are making little headway." In confirmation of this fact, he cited the case of a representative railroad which experienced an increase of 22.5 per cent hot journals in June, July and August, 1952 over 1951, and this in spite of a decrease of 11.1 in cars handled. On the basis of hot journals per 1,000 cars handled, the increase was actually 38 per cent. The total number of hot boxes on all roads was referred to as "appalling" and a serious deterrent to good railway service, net earnings and ability to meet competition.

As suggested by President Messimer, the time-worn contentions that oil is inadequate, packing not what it should be, better bearings needed, also more and better workmen, more time to do the work, cooler operating temperatures, etc., which are repeated from year to year, offer little hope of relief in a difficult situation if attacked singly. If all are subjected to the combined brains, experience, initiative and ingenuity of the railway and railway supply industries, however, it is inconceivable that real progress will not be made in controlling hot boxes within reasonable limits.

One of the plain bearing design characteristics sometimes overlooked but emphasized by President Messimer is the influence of high unit bearing pressures on lubrication failures, as is the case when new brasses are applied to journals worn to the smallest diameter allowable. With a new brass radius up to $^{9}/_{32}$ in. larger than the minimum journal radius, what constitutes practically a line contact between the two, steps up the unit pressure drastically. That this is something more than a theoretical objection is suggested by a study of 213 lubrication failures during June and July, 1952, which showed only 10 or 4.7 per cent occurred on full-size journals, seven of these happening two days after the application of new brasses. Also, fewer hot boxes generally are experienced on new cars with full-size journals.

The C.D.O.A. holds regular meetings only once a year and hence cannot participate very actively in what is essentially a day to day fight. A constructive effort would be to make the great combined experience of its officers and particularly its lubrication committee available throughout the year to every agency combatting the hot-box evil. It is also suggested that the value of annual meetings can be still further increased by cutting out generalities in all reports, including that on lubrication, bringing up specific facts, getting the concensus of the association on disputed points and thus developing recommendations which will carry real weight.

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New Books

THE MEASUREMENT AND CONTROL OF TEMPERATURES IN INDUSTRY. *By R. Royds. Published by the Chemical Publishing Company, 212 Fifth avenue, New York 10. 260 pages, 5½ in. by 8½ in.; cloth bound. Price $5.*

This book is a revision of one first published under the title of "The Measurement of Steady and Fluctuating Temperatures." The latest developments in temperature measurement and control best suited to the metal chemical, petroleum, rubber, and other industries are described and discussed in turn. The standardization and automatic control of temperatures in industry is discussed at some length, and attention is given to improving the quality and reliability of industrial products, an increased rate of production, and the saving of fuel and labor by the application of automatic temperature controls. The eight chapters of the book contain many illustrations and graphs, tables, and numerous equations for calculating results.

MECHANICS—PART 1: STATISTICS; PART 2: DYNAMICS. *By J. L. Meriam, associate professor of engineering design, University of California. Published by John Wiley & Sons, Inc., 440 Fourth avenue, New York 16. 340 and 672 pages, respectively. 6 in. by 9¼ in.; cloth bound. Price each volume $4.*

Statics integrates the usual pre-engineering background of physics, mathematics and graphics. It progresses in easy stages from fundamentals to advanced theory, with emphasis on the importance of principles and problems which apply them. Its seven chapters discuss Force Systems, Equilibrium, Structures, Distributed Forces, Beams, Friction, and Virtual Work. *Dynamics* covers in its six chapters Kinematics; Principles of Kinetics; Force, Mass, and Acceleration; Work and Energy; Impulse and Momentum, and Periodic Motion. It presents a large selection of problems which illustrate wide application to the various fields of engineering. Answers are given to approximately two thirds of the problems presented in each book, with keyed figures to clarify the particular problem described. Moments of Inertia of Areas and of Mass are discussed in Appendix A of each volume, with Useful Tables included in Appendix B.

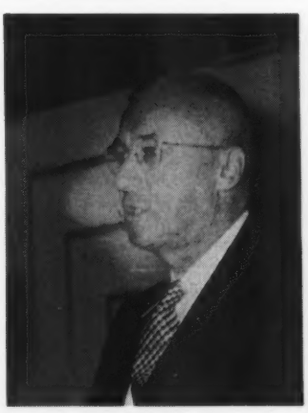
METALLURGY FOR ENGINEERS. *By John Wulff, Howard F. Taylor, and Amos J. Shalor, Department of Metallurgy, Massachusetts Institute of Technology. Published by John Wiley & Sons, 440 Fourth avenue, New York 16. 624 pages, 5½ in. by 8½ in. Cloth bound. Price $6.75.*

The first half of the book, which is written from the engineering rather than the shop viewpoint, explains the concepts and principles that underlie metal processing from ingots to finished articles of commerce. The second half deals with the processes themselves. The solidification of metals receives considerable attention as well as how the principles of metallurgy are applied to design and fabrication. Structure and properties of metals, impurity and solubility, alloys of carbon and iron, heat treatment of steel, powder metallurgy, and various welding processes are the subjects of other chapters.

The opening session of the Electrical Section's first meeting

Unified Electrical Section Holds First Annual Meeting

Single body now representing the electrical interests of both the Mechanical and Engineering Divisions, A.A.R., presents reports on applications to both rolling stock and fixed property



Chairman H. F. Finnemore makes his opening address

R. I. Fort accepts the nomination to serve as Vice Chairman during the coming year

CLOSE coordination of all electrical work done in both the Mechanical and Engineering Departments of the railroads was evidenced at the annual meeting of the A.A.R. Electrical Section, held at the Hotel Sherman, Chicago, September 15-17. An impressive exhibit of manufactured electrical products was staged by the Railway Electric Supply Manufacturers Association. The Coordinated Mechanical Associations held their annual convention at the same time with meetings at the Sherman and nearby hotels.

The first session of the Electrical Section was called to order at 10:00 a.m., Monday, September 15, by Chairman H. F. Finnemore, chief electrical engineer, Canadian National. In his address to the Section, Mr. Finnemore said that with the advent of the diesel locomotive, which is at least half electrical, and with air conditioning and a multitude of other things electrical, there is a need on the railroads for many technically-trained men. The situation, he said, has called for a coordination of things mechanical and electrical. The reports, he pointed out, are of a new high standard this year.

The most urgent need of the Section, Mr. Finnemore said, is new members, particularly young men. Membership in the Section, he said, will allow the young man to meet older men at his own level where he may benefit by their experience, and take an active part in railroad affairs. Membership, he said, is an apprenticeship to leadership and is really an essential part of a railroad man's job. There is, Mr. Finnemore said, no limit to the

number of members who may serve on a committee. A current problem, he said, is the consolidation of the Engineering and Mechanical Section manuals since the two Sections have combined. Following Mr. Finnemore's address, the incoming chairman presented him with a memorial gavel and a gold badge in recognition of his services to the Section.

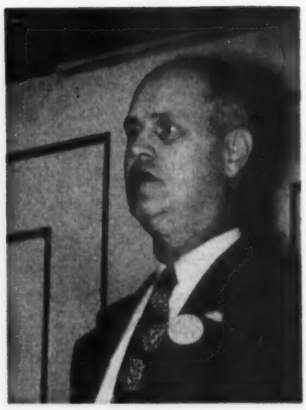
Election of Officers

Officers elected to serve in the coming year were as follows:

Chairman: C. A. Williamson, electrical engineer, Texas and New Orleans.

Vice-Chairman: R. I. Fort, diesel instructor, Illinois Central.

No new members were added to the Committee of Direction, since its membership is larger than necessary, being made up of members of the Committees of Direction of the two former Sections.



H. P. Wright explains some of the damages caused by electrolytic corrosion

C. R. Troop presents the report of the joint Committee on Wire, Cable and Insulating materials

Wire, Cable and Insulating Materials

The first technical report to be presented was that of the Joint Committee on Wire, Cable and Insulating Materials. The report deals with revisions of specifications for various types of insulated wire and concerns coordination of standards with other bodies, namely the American Society for Testing Materials, the American Standards Association, and the Underwriters Laboratories.

The report was presented by C. R. Troop, assistant engineer, New York Central.

In the discussion, J. F. Partridge (N.Y.C.) reported that his railroad is now using all neoprene insulated wire on circuits carrying less than 150 volts. K. H. Gordon (P.R.R.) said his railroad is using all neoprene insulated wire on new electric freight locomotives, and that it is serving very well as control circuit wire. Concerning different arrangements of stranding, the discussion disclosed the fact that in some cases the selection of strand wire sizes makes a wire with one size rating, nearer in cross section to another size.

Electrolysis

The report of the Committee on Electrolysis was presented by H. P. Wright, assistant electrical engineer, Baltimore & Ohio. The report calls attention to the increase in number of failures of underground structures, buried pipe and cable which were near formerly electrified street-railway tracks. In numerous areas, transit companies have abandoned electrified track and operators of other structures are finding that the removal of the stray railway currents has allowed the weaker currents of natural corrosion to flow unopposed.

Comparatively few railroads have an organization set up to handle electrolysis or corrosion problems affecting their buried structures. With the addition of recent extensive underground diesel oil facilities to present water and gas mains, etc., on railroad property, the report states it behooves railroad management to take the necessary steps to reduce or stop the ravages of corrosion by proper application of modern methods. Corrosion weakens structures and entails costly repairs or replacements.

Reference is made to the experience of utility companies which have materially reduced the ravages of electrolytic corrosion by means of ground rods, cathodic protection and the replacement of damaged cables with cables having non-metallic sheaths.

Several years ago, the Southern Pacific applied cathodic protection to a number of steel water tanks and the effectiveness of this protection will be covered in a subsequent report of this Committee.

In presenting the report, Mr. Wright said it is common practice to have pipes and tanks destroyed by corrosion and replaced with nothing done to prevent the corrosion. Further study and application, he said, should pay real dividends, since the situation has been made especially important by many new diesel fuel supply installations. In one instance, he reported, a railroad discovered that shortly after an installation was made, it was losing more oil than was being used. The installation was made with bare steel pipe buried in the ground. W. E. Ripley (N.Y.C.) was asked to show a plaster cast of a pipe which had been installed with a protective covering, but in which corrosion had eaten into the pipe at least a quarter of an inch.

In response to a question about how corrosion of a utility property increased after the abandonment of a nearby street-railway, Mr. Wright explained that the railway return so shifted ground currents as to cause a deposit on the utility company's buried structure and that afterward the currents of natural galvanic action were allowed to take over and destroy the metal.

S. R. Negley (Reading) asked how effective the Southern Pacific's tank protection could be with varying levels of water in the tanks. Mr. Wright replied that it applies to the entire area of the tank, but is expensive since it uses platinum wire. It has not, he said, been in service a sufficient time to prove itself. He told about a leak appearing about two feet from the ground in a water tank on his railroad, and how investigation showed there was not much tank left. We are, he said, doing away with most of our large water tanks, but are installing many oil tanks. Chairman H. F. Finnemore asked if a pipe line having cathodic protection which parallels a railroad might affect signal operation. Mr. Wright replied that it could, and that cooperation between the two companies is essential. The National Society of Corrosion Engineers, he said, is doing valuable work and he suggested the committee should follow their activities and work with them.

Reference is made to valuable information contained in reports presented to other societies also concerned with this subject. Two of these reports, presented to the National Association of Corrosion Engineers, Milam Building, Houston, Texas, are respectively, "Report of Correlating Committee on Cathodic Protection, July 1951" and "Design of Anode Systems for Cathodic protection of Underground and Water Submerged Metallic Structures, April 1950". A third paper recommended is "Reference Book on Instruments for Electrolysis, Corrosion and Cathodic Protection Testing", American Gas Association, 420 Lexington Avenue, New York 17.

S. R. Negley outlines developments in the field of corrosion resisting materials

C. J. Wallace tells how five New Orleans terminals will be consolidated into one

Corrosion Resisting Materials

The third technical report presented was that of the Committee on Application of Corrosion Resisting Materials to Railway Electrical Construction. The report states that no new developments have come to the attention of the committee concerning the use of coatings for application to hardware in service, with the possible exception of a new synthetic material being advanced for coating of pump impellers and condenser tube and sheet protection. It consists of a neoprene base coating impervious to alkali and acid as well as moisture which is applied by repeated coatings either by brush, by spray, or by repeated dippings to obtain the desired thickness.

The use of this material would have application to those items of hardware or line material subject to unusually corrosive atmospheres such as tunnel construction and particularly such items as could be processed in a shop or headquarters prior to installation.

It is believed the material while suitable for the above mentioned applications, would bear investigation for any application where corrosion problems are sufficiently severe to warrant its use. For those interested in a more detailed description of the material, inquiry may be addressed to Synco Corporation, Box 151, Emmaus, Pa.

The report also suggests that, because it involves such a wide field other than electrical construction, the study of the corrosion of metallic structures exposed to diesel locomotive exhaust be referred to the Research Division, A.A.R. S. R. Negley, electrical engineer, Reading, chairman of the committee, presented the report.

New Orleans Union Passenger Terminal

A special report on the New Orleans, La., Union Passenger Terminal, now under construction, was presented by C. J. Wallace, manager of the terminal, and J. M. Trissal, assistant chief engineer, Illinois Central. Mr. Wallace presented an overall picture of the terminal and its function and Mr. Trissal provided a technical description of the facilities. A consolidation of rail operations in New Orleans was necessary to relieve traffic congestion. The terminal will replace five passenger stations with one, and will reduce the number of railroad-street grade crossings from 144 to 27. Both locomotive and car maintenance and servicing facilities will be included.

The situation afforded a rare opportunity for the designers, since there were none of the usual restrictions. The terminal could be designed without having to place equipment to fit into existing buildings to conform with platform widths, to meet existing operating conditions, etc. A few of the electrical features are as follows: Battery charging will be done by portable charging sets operating from the 220-volt standby power. Double 100-amp., standby power outlets will be located at 160-ft. intervals. Portable cables will have three power conductors and three ground wires. Everything possible will be placed above the ground because of ground conditions in New Orleans—some of the city lies below sea level. The 1,500-kva. transformers in the station allow for 10 hp. from each standby outlet simultaneously. A similar arrangement will be used in the coach yard. The lighting system provides good illumination on the platforms. Secondary distribution cables are run over the platform canopies, and are carried on the lighting standards. Lighting fixtures in the yards consist of three, 400-watt mercury lamps on each pole. There is one on the pole and one at each side on a 28-ft. arm over the tracks. All transformers and cables are mounted overhead because of water conditions. The arrangement also avoids the use of valuable platform space. Both speakers showed diagrams and colored pictures on the screen to indicate the present status of the construction work.

J. M. Trissal described the electrical features of the New Orleans Terminal

Power Supply

The report of the Committee on Power Supply was presented by C. P. Trueax, assistant electrical engineer, Illinois Central. The first section of the report prepared by L. C. Bowes, electrical engineer, Rock Island, shows that their diesel locomotive service shop, capable of handling 30 to 35 single diesel units per 24-hr. period, requires a total connected electrical load of 350 hp.

The second part of the report, prepared by H. A. Hudson, signal and electrical superintendent, Southern, concerns generating equipment for roadway tools. The committee will send out a questionnaire on this subject and attention is called to reports on this subject, appearing in the A.E.R.A. proceedings, pages 253 to 255, 1943, and pages 347 to 350, 1949.

Section 3 of the report, compiled by G. L. Sealey, assistant engineer, Reading, points out that where standby power exceeds the capacity of 100-amp. plugs and receptacles, the load may be carried through two or more wayside receptacles connected to duplicate receptacles on the cars. Where trouble has been experienced with magnetic trips, with settings of 170 amp. minimum, and 480 amp. maximum, the report states that for such cases there are available for mounting in the standard 100 amp.

C. P. Trueax conducts the presentation of the report of the Committee on Power Supply

frame breaker, adjustable magnetic trips with a trip range of 450 to 1,200 amp.

The air conditioning standby distribution system at the Jacksonville, Fla., terminal is described in the third section of the report, prepared by C. S. Stringfellow, assistant engineer, Atlantic Coast Line. The system provides 220-volt, 3-phase, power to the cars of all tenants in the yard, and is so engineered that it is not necessary to have cables cross platforms or tracks. It is, in fact, four separate systems, each serving a particular terminal area, and will meet load requirements of a 30-hp. standby motor per coach, or in the case of dining cars, two 30-hp. motors per car. A total of 132 duplicate receptacles supply power to the cars and these are fed by four substations having an aggregate capacity of 1,575 kva. The 750-kva. substation which is the largest of the four, is shown in the illustration.

Equipment for Fuel and Sanding Plants

To determine what type of electrical equipment should be used for diesel fuel and sanding plants, a questionnaire was first sent to railroads and 56 replies were received. The results are compiled in the fourth section by R. H. Herman, engineer shops and equipment, Southern. In this type of installation state regulations do not govern the type of equipment used in most installations. Explosion-proof motors and motor controls have the greatest acceptance for driving oil pumps. Opinion is divided on pushbutton station enclosures, 15 using N.E.M.A. Type VII enclosures, 18 using N.E.M.A. Type I enclosures and 9 using N.E.M.A. Types III and IV. For disconnecting switch or circuit-breaker enclosures, there is a similar division, 16 using Type VII and 21 Type I enclosures. In both cases, a number of railroads did not reply. Concerning grounding, replies showed a preference toward N.E.C. standard grounding. Most of the lighting fixtures used are either explosion proof or vapor proof.

Present practices for lubricating oil reclamation plants are apparently similar to those for oil storage, a few going to Class I Group D equipment, because of the elevated temperatures involved. For sand plants, the expressed preference is for totally enclosed motors and dust-tight control enclosures. Vapor-proof lighting fixtures are preferred for sand houses.

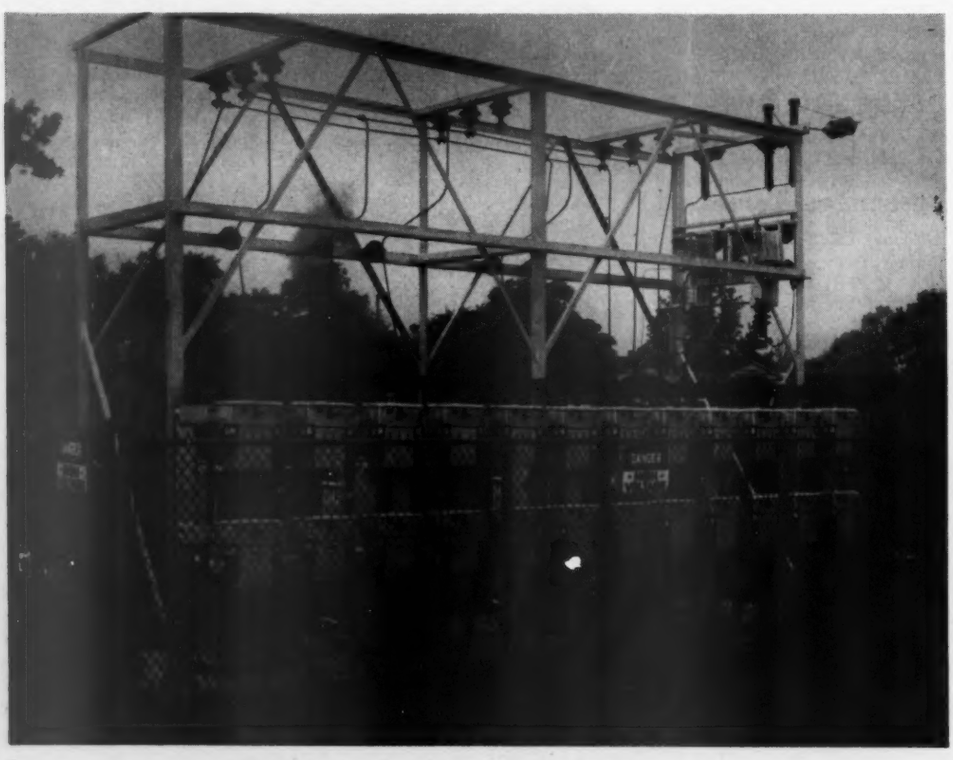
The final section of the report, prepared by A. L. Veith, assistant electrical engineer, Wabash, describes a fuel and sanding plant for diesel locomotives on the Wabash at Moberly, Mo. The oil storage consists of one 100,000-gal. steel tank to which a 500,000 gal. tank is to be added.

Following the presentation of the report, the relative meaning of the terms flammable and inflammable were discussed and the explanation was offered that they are really the same but that the term flammable was generally replacing the other.

In reply to a question concerning ways of insuring that fuel pumps be shut off, after a locomotive is fueled, D. M. Burckett (B. & M.) said that it has been successfully accomplished by using the by-pass fuel oil temperature as the control medium. D. F. Dunsmore (C. & O.) said that the use of flow switches was being considered by his railroad.

Electric Heating

The report of the Committee on Electric Heating was presented by C. A. Williamson, electrical engineer, Texas & New Orleans. The first part of the report, prepared by H. C. Cross, engineer electrical construction, Baltimore & Ohio, deals with electrically-heated glass windshields used in New York Central m.u. cars. It supplements the previous year's report on this subject and adds the information that current to these glass panels



The 750-kva., 13,200-volt Jacksonville Terminal substation showing the twenty-four 300-amp. oil circuit breakers for the 240-volt feeders

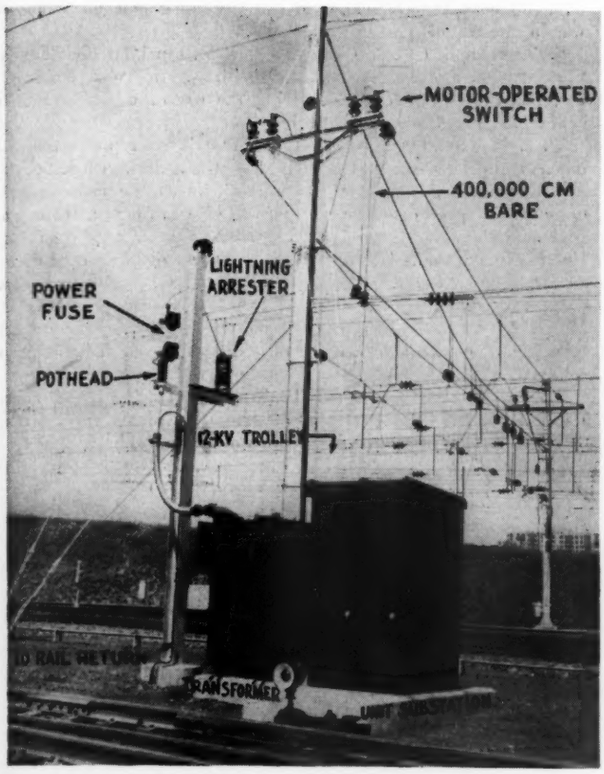


Fig. 2—Unit substation power supply

is supplied at 110-volts, a.c. from a motor alternator operating from a 64-volt battery. The current is about 1.5 amp. and this will raise the surface temperature of the glass 20 to 30 deg. F. above the outside temperature.

The second part of the report, signed by H. C. Griffith, Jr., electrical engineer, Commercial Section, Transportation Divisions, General Electric Company, describes an application of electric strip heaters to a transfer car for the purpose of thawing frozen

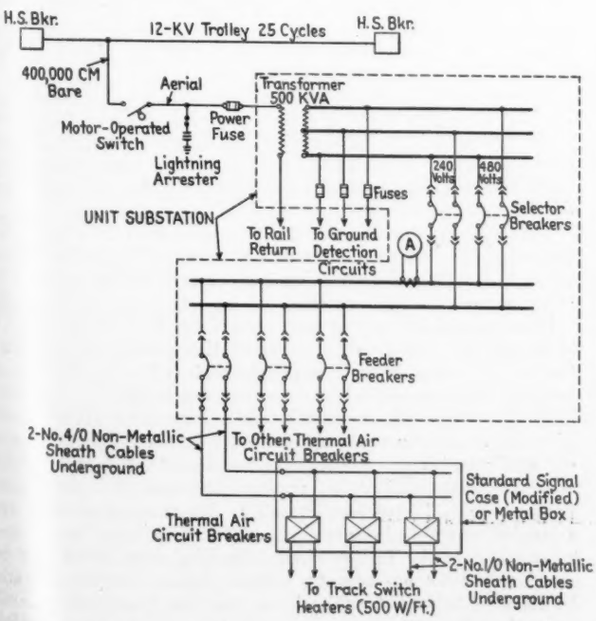


Fig. 1—Schematic wiring diagram for typical unit substation supplying power to electric heaters for track switches

C. A. Williamson, Vice Chairman of the Section, also presented the report on Electric Heating

ore. This installation was described in the July 1952 issue of *Railway Mechanical and Electrical Engineer*, Page 90.

Power supply for electric heaters for track switches in electrified territory on the Pennsylvania is the subject of a section of the report signed by L. B. Curtis, assistant engineer, Pennsylvania. It describes an installation in which power is supplied directly from the 12-kv., single-phase trolley circuit. The transformer used is rated 550 kva. and power is fed to switch heaters at 480 and 240 volts. A wiring diagram is shown in Fig. 1 and a picture of the installation in Fig. 2.

Recommended standard specifications for tubular type electric heaters for track switches have been compiled by a sub-committee of six of which E. B. Hager, assistant engineer, Illinois Central, is chairman. These are complete in detail and constitute the final section of the report.

In the discussion, R. I. Fort (I.C.) raised a question about the wattage used in windshield heaters, and it was pointed out that it had been selected to suit the weather requirements of the New York City area. S. B. Pennell (N.Y.C.) reported that the operation of the heater glass had been trouble-free and completely successful.

J. D. Sylvester asked for the size of the hopper cars to which strip heaters had been applied and Mr. Williamson replied that it was 60 tons.

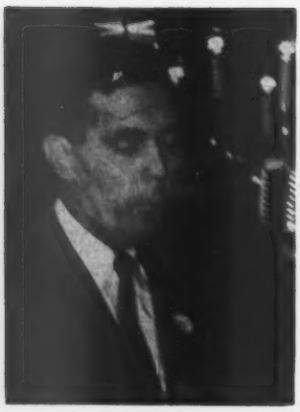
Asked why more control, as in previous installations, was not used in the one described in the report, L. B. Curtis (Pennsylvania) replied it was a matter of transformers. The old specifications, he said, required special transformers and in recent years it had been impossible to obtain other than standard transformers. He said, it is his opinion that conditions can be met by using different sizes of heaters with standard transformers. S. R. Negley (Reading) said it is necessary to have heaters of sufficient size to allow for the worst weather conditions, and asked how it is possible to avoid getting them of greater than necessary size. Mr. Curtis replied that the committee will make recommendations. He also said that the Pennsylvania has an arrangement whereby the output of a 500-watt heater may be reduced to 125 watts. The A.A.R., he said, is developing information on the use of thermostats for track heater control.

Radio and Communication Systems for Rolling Stock

Specific information covering installation, operation and maintenance of communication systems on locomotives and layout for wiring and equipment are being assembled by the Committee on Application of Radio and Communication Systems for Rolling Stock working with Committee 4 of the Communications Section.

The major part of the report consists of a resume of a paper, "Practical Aspects of Using 12-Volt Power Plants on Radio-Equipped Cabooses," which was presented to the Communications Section by L. E. Verbarg, electronics engineer, Missouri Pacific, in October 1951. The resume is as follows:

Fifteen months' operating experience with 60 cabooses which were equipped with a 12-volt, axle-driven caboose power plant,



W. S. Heath outlines the status of caboose power supply

at a cost of approximately $700 per caboose, indicate that maintenance costs and dependability compare favorably with other systems generally used for caboose power.

The alternator drive consists of a continuous "V" belt axle and idler pulley arrangement with a second upper belt drive to give a 6.7 to 1 drive ratio so that the alternator starts to charge the battery at 12 m.p.h. and full-rated charging is obtained at 20 m.p.h. The only maintenance required for this drive is lubrication of idler pulleys every six months and replacement of belts. The lower or axle drive belt requires replacement every 12 to 18 months while the upper or alternator drive belt shows an indicated belt life of three or four years.

The generating equipment consists of a Leece-Neville Company power plant which includes an alternator, rectifier and regulator and is rated at 14-volts and 75 amp. It is installed entirely above the caboose floor for its own protection and for ease of installation and inspection. This power plant is mounted on single shop-made brackets as complete units which can be exchanged and carried by one man when necessary. To date there have been ten occasions to remove regulator rectifier assemblies; one to replace a burned out control rectifier, two for stuck voltage regulator relay contacts and seven for voltage regulator adjustment. No alternators have been removed or serviced and inspection of alternator brushes indicates that there is no need for their immediate replacement.

Storage battery capacity is provided by two 6-volt, lead-acid cells connected in series, rated at 240 amp.-hr. at the 20-hr. rate. These batteries are commonly used in bus and truck service and are expected to have about four years average life. Radio equipment used is manufactured by Motorola, Inc., and draws 11 amp. at stand-by. No external power converters are needed as the required plate and bias voltages are produced by two small vibrators and a dynamotor, and tube filaments are connected in series groups directly across the storage battery. Each caboose contains 18 receiver and 10 transmitter tubes. No variation in radio operating characteristics has been noticed under any charging or discharging condition of the batteries encountered with a normally operating plant.

Thus, after installation and 15 months' experience with 60 cabooses, it appears that 12-volt caboose installations similar to those described, may offer certain economic advantages over so-called conventional systems. Reduced first cost is apparent now. Reduced maintenance costs due to case of equipment handling and the relatively low cost of maintenance parts seems to be becoming a reality—without sacrifice in dependability or performance of the train radio equipment.

The chairman of the committee is W. S. Heath, electrical foreman, Lines East, Atchison, Topeka & Santa Fe, who presented the report.

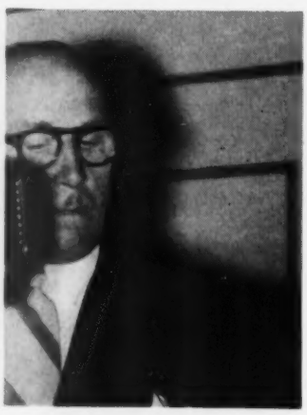
During the discussion, A. L. Kelly (M.P.) supplied additional information on the radio-equipped cabooses described in the report. He said that while they had experienced some maintenance problems, the equipment had worked very well. One of their difficulties, he said, arose from the fact that it was difficult to locate a certain caboose in a large yard area. This was largely overcome by establishing a caboose track. He also said that the performance of maintenance work on the cabooses had been largely eliminated by keeping spare parts of the equipment on hand so that practically all the work done on the cabooses was a matter of parts replacement.

S. B. Pennell (N.Y.C.) asked if the Missouri Pacific installation included any battery charging facilities. Mr. Kelly said it did not, but that they were considering the use of a small rectifier charger to avoid moving batteries.

W. J. Madden (Pennsylvania) said that in many areas there is much train movement at speeds less than those used by the Missouri Pacific. Chairman Heath replied that the ratio of axle to generator speed could be increased to give full load at 12 m.p.h.

Mr. Madden said this would increase belt torque and Mr. Heath replied that, if necessary, this could be taken care of by adding more belts. J. J. Schmidt (D. & R. G. W.) asked what effect the voltage variation of 12 to 15 volts had on tube life. Mr. Heath replied they had had no trouble arising from short tube life. The saturable core in the vibrator, he said, holds good voltage.

R. H. Russell (G.N.) asked about the feasibility of using a d.c. generator with a voltage converter. Mr. Heath replied that they have such installations which work very well.



E. J. Feasey explains the work being done to standardized diesel-electric locomotive wiring diagrams

Wiring Diagrams for Rolling Stock

The report of the Committee on Wiring Diagrams for Rolling Stock was presented by E. J. Feasey, general supervisor, diesel equipment, Canadian National. Mr. Feasey explained that the work of this committee was required because different manufacturers had different standards.

The first part of the report recommends a list of symbol numbers for the many electrical devices on a diesel locomotive, these to be incorporated in Section H of the Electrical Section Manual covering wiring diagrams for rolling stock. Thus, the symbol number for a.c. motors and generators is 34, for armatures it is 32, for auto-transformers it is 29, etc.

The second part of the report is concerned with the standardization of wiring diagrams and markings. It recommends that certain pages in the manual concerning gaseous rectifiers be replaced by others included in the report.

Discussion of the report was opened by A. L. Kelly (M.P.), who suggested that special consideration be given to battery leads which come up through the floor. He said that on his road two fires had been caused by shorts in these cables.

H. W. Dillon (T. & N. O.) asked what kind of cable and what kind of circuit protection should be used, saying that it was easily possible to run into starting trouble. R. I. Fort (I.C.) said it is very difficult to provide protection for all circuits. Failures, he said have been caused by deterioration of fuses, and a number of railroads have eliminated battery fuses, special care being given to the battery circuit. He said that for himself, he would rather not use breakers under a locomotive. He also said he did not like fuses for this circuit, but that it might be possible to use link fuses that can carry 1,200 amp. A. L. Kelly (M.P.) said he considered 1,200 amp. to be a modest value, but thought that short-circuit protection was desirable.

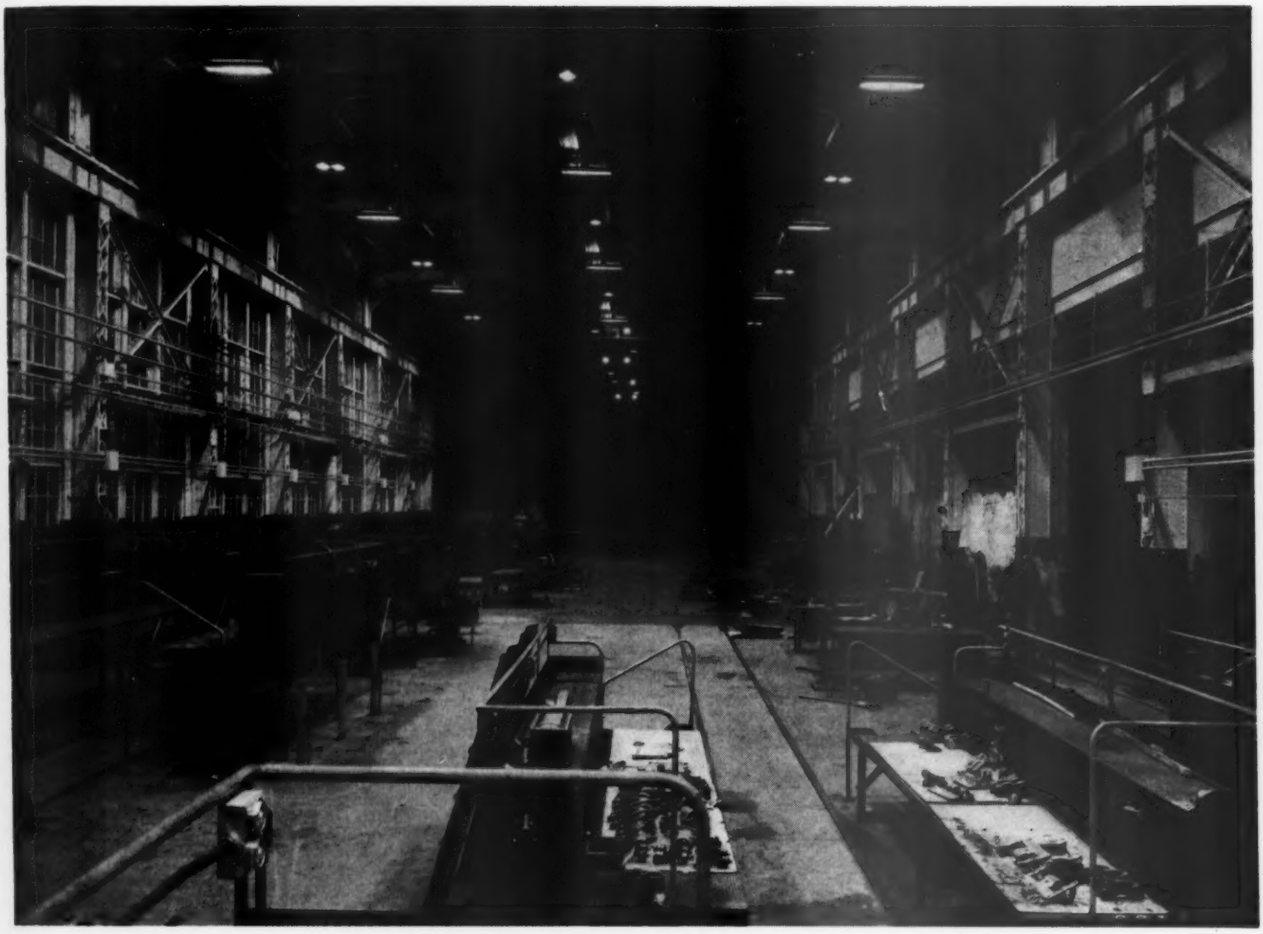


Fig. 1—The New York Central's diesel locomotive repair shop at Collinwood, Ohio, during the process of relighting

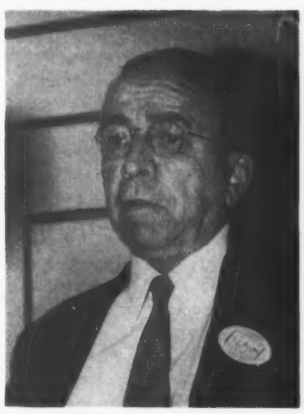
Called upon by the Chair, P. A. Hatch (General Electric Company) said the first problem is fire hazard. Protection, he said, can prevent fires, but operation of a protective device can cause trouble which may require a shop job. Investigation of the subject, he said, is desirable, but that for the present, no protection is best.

C. W. Martin (B. & O.) said that many of the shop men on his road want detailed as well as schematic wiring diagrams. He said that it is B. & O. practice to place an easel on which were mounted complete wiring diagrams beside a locomotive being wired. This, he said, had proved to be the only satisfactory way to make diagrams available to all men working on different parts of the locomotive.

Illumination

The report of the Committee on Illumination was presented by L. S. Billau, electrical engineer, Baltimore & Ohio. It lists and describes new types of standard and color-corrected mercury lamps which are now available. Concerning the color-corrected lamp, the report states that the advantage anticipated for the lamp is that it will render unnecessary the use of supplementary incandescent lighting on a large scale for such installations where the inherent color of straight mercury lighting is objectionable. Where the inherent slow starting characteristics of a mercury lamp are an objectionable feature, it would still be necessary to install a small amount of incandescent lighting with the color improved mercury lamp to provide some illumination during the starting period of the regular system.

With reference to the application of lamps to shop lighting, the report makes suggestions as follows:



L. S. Billau outlines the present status of the mercury lighting for railroad shops

For railroad shop lighting where high intensities of illumination are desired, the range of sizes of mercury lamps now available is such that for smaller sizes of lamps with relatively lower mounting heights, the use of mercury lamps overlaps the field of fluorescent lamps. Where higher mounting heights are necessary, around 20 ft. to 40 ft. or more, adequate illumination and good light control can be secured with comparatively few lamps, as compared with fluorescent units. This indicates that lighting with mercury lamps, particularly with the color improved lamp, would be preferable to fluorescent lighting. For the very high mounting heights, the mercury lamp only is suitable.

In addition to the new types of mercury lamps, there have also

One of the platforms in the Pennsylvania's station at Philadelphia, Pa.

been developments of incandescent lamps for shop lighting purposes. Filament types of reflector lamps, both of the flood and spot distribution types, in the 150- and 300-watt sizes, have been available for some time. This line has now been extended to include 500- and 750-watt reflector type lamps.

For the illumination of shop areas where it is not considered desirable to provide the higher intensities of illumination obtained with the more costly mercury and fluorescent lighting systems, the use of the reflector type of lamp is growing rapidly. They are particularly suited to shop conditions where rapid accumulation of dust and gases, etc., renders it very costly, if not impracticable, to clean the standard type of steel reflector lighting units.

Concerning the lighting of locomotive repair shops and terminal servicing facilities, the report states that with the availability of the highly efficient mercury and fluorescent types of lamps, it becomes economically practicable to provide very much higher intensities of general illumination for railroad shop lighting than was possible with incandescent filament lighting.

Footcandle intensities recommended for such applications vary from 30 to 50, with 100 for injector inspection, and 1,000 for local lighting for arc welding.

Fig. 1 is referred to in the report as follows: An outstanding example of the ability to secure high intensity general illumination in a large locomotive repair shop of the high bay type, where lighting units must be mounted above the cranes. This is the new lighting system being installed by the New York Central in its steam locomotive repair shops at Cleveland, Ohio, now being converted for diesel-electric locomotive repair work only. In the high bay area, the installation consists of 3,000-watt mercury lamps combined with the use of reflector type, 750-watt incandescent lamps. The spacing distance of mercury lamps is 22 ft. by 26 ft. with a 40-ft. mounting height. The average illumination is 50 footcandles. The effectiveness of the lighting installation has been greatly increased by painting the interior of the shop a light color. The photograph shows a night view of the high bay part of the shop with the new lighting system in the foreground, and in the background, the original lighting system in the portion of the shop which has not been converted. No doubt when the original lighting was installed in this shop, it was considered good illumination practice and the photograph shows in a very striking way a comparison of older systems of shop illumination with modern lighting systems providing high intensity of illumination.

An example of good station platform lighting is shown in Fig. 2. With reference to this installation, the report states that the illumination of the Pennsylvania's platforms in the station at Philadelphia, Pa., was the subject of an exhaustive study and test to determine the most practicable unit to provide relatively high intensities of illumination, comparable to present day standards of illumination. As the platform ends are open, the temperature occasionally drops to around zero degrees with the consequence that there was considerable question as to whether fluorescent lighting could be used successfully. Various types of lamps and fixtures were tested and the unit finally adopted is an enclosed dust-tight fixture using two 96-in. T-12, 75-watt, 430 mill-ampere slimline lamps, with lead-lag type ballast for low temperature operation.

These fixtures are mounted in two rows, 11 ft. above and 4 ft. from the edge of the platform, on a 7/16-in. steel messenger wire suspended from the ceiling and strung the length of the platform. The fixtures are attached to the messenger on 16-ft. centers, with the two rows staggered to obtain as even a distribution as possible.

Illumination readings taken one month after the initial installation was put in operation showed an average of 23 footcandles along the row of fixtures, and 21 footcandles along the platform edge. After one year of continuous operation, there has been no lamp failure, no cleaning of any kind and illumination has only dropped to an average of 19 footcandles along the row of fixtures, and 17 footcandles along the edge of the platform. Observations made at 9 deg. F. showed no noticeable effect on the output of the lamps.

Discussion was opened by R. H. Russell (G.N.), who stated that warm colors of light made people feel warmer, while the greens and blues make them feel cooler and suggested that this subject be given further study. Mr. Billau said the Baltimore & Ohio has adopted the warm white fluorescent lamp as best for all purposes where fluorescent lamps are used. He added that since new phosphors and new colors had recently been introduced, the committee will continue the study of their effectiveness.

J. J. Schmidt suggested that the 12-watt, 30-volt, No. 1348 lamp should be given consideration for car lighting. M. A. Mortensen (G. E. Company, Lamp Div.) supplemented Mr. Schmidt's suggestion by supplying the specifications and characteristics of this lamp.

P. O. Lautz (A. T. & S. F.) said he would like to see the Committee on Illumination adopt I.E.S. standards or have an interpretation of them for all railroad lighting.

Referring to Fig. 1, K. H. Gordon (Pennsylvania) said that in reality the old lighting shown in the background is almost nothing while the lighting in the foreground, with its new light and clean walls, gives the effect of daylight. The picture, he said, really does not show this effectively.

Car Electrical Equipment

The report of the Committee on Car Electrical Equipment was presented by Committee Chairman, S. B. Pennell assistant engineer New York Central. Referring to the two diesel undercar power plants which have been in service on an Illinois Central diner since October 1951, the report states that performance has been satisfactory and the major improvement made was to change the exhaust outlet from a point under the car to the roof. From October 8, 1951, to March 11, 1952, the units each ran 3,354 hours, each consumed about 4,680 gal. of fuel, used 1.39 gal. fuel oil per hr. and each used 262 gal. of lubricating oil. The average cost of electrical maintenance per day, not including overhead, was $14.48.

One manufacturer reporting to the committee states that ten railroads and the U. S. Army are now using its units, totaling 130 units in service. Of the 130 units, 90 are d.c. machines, being almost equally divided between 32- and 64-volt systems. The remaining 40 units are 220-volt, 3-phase, 60-cycle machines. The manufacturer advises that after a period of four years, it has collected enough data to recommend that the units go into a shop for check-up and overhauling every 7,000 hours of operation.

Another manufacturer advised that seven railroads are now using its units, totaling 26 units in service and 126 units are going to the U. S. Army for use on hospital cars. They recommend the units be shopped after every 6,000 hours of operation. The average fuel oil consumption in normal service is approximately 1½ gal. to 2 gal. per hr.

Two very important features, the report states, have been learned in the operation of diesel engine-driven generator units. One is the necessity of arranging the application so units may be changed quickly, and the other is protecting the fuel tank and fuel lines from freezing.

On the subject of electric cooking, the report announces that six coffee-shop cars, equipped with Radaranges for high-frequency, high-speed cooking go into service this year, four of them having been placed in service on March 17.

In response to an assignment to study protection of flexible cable leads under cars, the report states that until recent years all undercar machines were equipped with cable leads having a soft rubber insulation with braided outside jacket, protected with a canvas boot or rubber hose. Manufacturers now recommend rubber insulated, neoprene coated wire for this purpose, and the committee is also giving consideration to the use of Silastic material.

Suggested practices for working on car electrical equipment are included in the report as follows:

No persons other than qualified electrical workers shall be permitted to test or make repairs to any electrical apparatus.

High voltage may exist on car electrical apparatus and injury may occur if proper caution is not used when handling or testing the apparatus.

Where resilient mountings are used on electrical equipment such equipment must be properly grounded.

Under no circumstances shall equipment other than necessary electrical parts be carried in electrical lockers.

Electrical lockers must be kept in a clean and orderly condition.

This Committee recommends that the Committee on Passenger Car Specifications give consideration to the following items for all cars to be constructed in the future:

1. Larger and more accessible electric lockers for all cars.
   (a) Where room type lockers are used, sufficient room must be provided to permit workman standing and working inside locker (a minimum of 12 square feet).
   (b) Other type lockers should be arranged such that panels can be readily removed and all parts requiring adjustments be easily accessible.
2. The electrical locker housing the switch board, air-conditioning control, and master control panel, be separate from the locker housing the electrical apparatus. Switch board and air-conditioning control panel shall be dead front type with circuit breakers in lieu of knife switches and fuses.
3. Adequate lighting in electrical lockers.
4. Pipe lines, other than electrical conduit, shall not enter electrical lockers.
5. The electric lockers must be properly ventilated to prevent burned out resistors, coils, etc., due to excessive temperatures.

S. B. Pennell presenting the report of the Committee on Car Electrical Equipment

6. All wires should be equipped with approved terminals and identified with markers. The terminal posts must be plainly marked.
7. All contactors, relays, switches, fuses, and resistors must be plainly marked, showing their capacity and use.
8. It is recommended that all applicable N. E. C. rules be followed.

Recommended practice for trainlining car batteries is also included as follows:

Stencil voltage on trainline receptacle cover.

Stencil on, under or adjacent to trainline switch or circuit breaker, the following notice:

STOP

This car has ..... volt batteries and must only be trainlined to a car with ..... volt batteries

Stencil on inside of locker door as near as possible to trainline switch or circuit breaker, the following instructions:

TRAINLINE INSTRUCTIONS

1. Make sure trainline switches on both cars are open.
2. Apply jumper between cars. Both cars must be ..... volts as shown by receptacle markings.
3. Close trainline switch on defective car and on car to which jumper is connected.
4. To trainline through car or cars of different voltages follow procedure outlined above but do not close trainline switch on intermediate car or cars.

In the final section of the report, the committee has developed information and suggestions for a design of generator and motor shaft extensions and shaft materials which will permit interchangeability between the machines produced by the several manufacturers.

Following his presentation of the section of the report on undercar power plants. C. A. Pearman (I.C.) said it is still quite incomplete and will be supplemented in later reports.

In response to a question from Chairman Pennell, J. O. Fraker (T. & P.) said that T. & P. experience with the single unit it has in service, has been very satisfactory. Costs on this unit, he said, have been much lower than those given in the report. Asked if the unit had been overhauled, Mr. Fraker said the engine had been taken down once for observation, but not for overhaul. Mr. Pearman said that costs are largely dependent on type of service, and that it is not always possible to develop daily cost figures.

L. C. Bowes (C. R. I. & P.) reported having 30 units in service, and said the most important requirement is to keep dirt out of the engine intake. Much fine dirt, he said, particularly in the desert, will get into the engine in spite of filters. He feels that it may be desirable to take air for the engine from the car body. Some units, he said, were fitted with new rings after 3,000 hours of service and others after 6,000 hours. Mr. Fraker said they had started by taking air from the car, but now take it through filters because of pulsations set up in the car.

Asked about failures, Mr. Pearman said they had had five, most of which were due to electrical, and not engine, trouble. These, he said, were plant failures, and not car failures. His road,

he said, has had power plants in service using General Motors engines which provide waste-product heating. The only trouble with them, he said, has been due to faulty applications which caused recirculation of air through the engine radiator. One installed in 1937 gave 40,000 hours of service.

R. I. Fort (I.C.) raised a question about grounding of 220-volt circuits on cars, saying he does not like to use them ungrounded. W. J. Madden, (Pennsylvania) said it is his road's practice to ground frames of motors, etc., but does not believe the grounding of circuits would be good practice. A. L. Kelly (M.P.) said the car is grounded and that should be enough. Mrs. Bowes expressed the opinion that it is best to keep grounds off at all times.

G. W. Wall (D. L. & W.) asked about the effect of electric ranges on the heat in the kitchens. Mr. Pearman replied that they reduce the heat considerably, and that he will make measurements. Mr. Fort said that one measurement had been made when the outside temperature was 90 deg. F. A reading taken inside at a point where radiant heat did not affect the thermometer showed a temperature of 95 deg. F.

Mr. C. A. Williamson (T. & N. O.) expressed the opinion that there is need for grounding even if it is only to reduce the phase voltage to that between a terminal and the center of the *Y* connection. Mr. Kelly cited cases in which two men had been tied up by getting between the cable plug and the car. Mr. Fort added that in addition to the personal hazard, a man can get a nasty static shock from an ungrounded circuit. Chairman Pennell said the subject will be further explored.

The report was brought up to date on a request from K. H. Gordon (Pennsylvania) and it was disclosed that the first water-cooled magnetron tubes used for producing high frequency power for cooking had a life of 25 hr., while the present air-cooled tubes are expected to give 1,000 hours of service. The circuits may be readily repaired by television repair companies.

T. G. Isel (Pullman Co.) said that Silastic material is quite expensive, tht it is good for high and low extremes of temperature and asked if neoprene were not satisfactory. Mr. Pearman replied that neoprene jacketed wire is very good under the car, and that Silastic material might meet the needs of very severe conditions. Mr. Dougherty (B. & O.) said canvas boots and cotton braided wire covering had been ruled out on the B. & O. because of fire hazard. Neoprene, he said, is satisfactory. Mr. Wall added that his road has had no trouble due to breakage with tough-covered cables and that ice does not form on their smooth surface as it does on canvas boots. Their life, he said, is years.

In presenting the section of the report on practices for working on cars, Mr. Pearman explained that because of the higher voltages now used, he thought it necessary to place emphasis on the recommendation that no persons other than qualified electrical workers should be permitted to make tests or repairs.

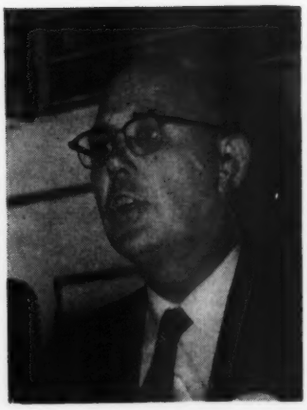
A. E. Voigt (A. T. & S. F.) suggested that the Section might advocate a nationally supplied lock and key with the key only in the hands of electricians so that mops and brooms, etc., would not be kept in the electric lockers.

Mr. Isel pointed out that the committee's proposed rule would allow putting all trainline receptacles in the lockers.

W. S. Weff (F. E. C.) said his road is making safety improvements in all cars having voltages above 32. Lockers have insulated walls, switchboard matting on the floors and protected terminals. The voltage is posted in the lockers and instructions are issued to trainmen to keep out of lockers except in case of emergencies. It is necessary, he said, that they be permitted to get in, in case of fires which may cause smoke. Maintainers, he said, are supplied with insulating aprons to place over exposed parts in lockers. There are also convenience outlets in the lockers to provide light for the maintainers from the battery when the power is off.

P. H. Hatch (G. E. Company) suggested that lockers should be equipped with holders for jumpers and extra fuses. A. E. Lines (S. P.) said his road makes a practice of carrying fuses, connectors and lamps in holders in the lockers. Mr. Pennel explained that this work had been started because there had been fatal accidents caused by unauthorized use of lockers.

After continuing discussion, it was moved and approved that everything but permanently installed equipment be kept out of the lockers of all new cars. L. H. Sulton (S. P.) said that to adequately protect a man removing trainline connectors, his road had issued instructions to open switches before trainlines are removed.



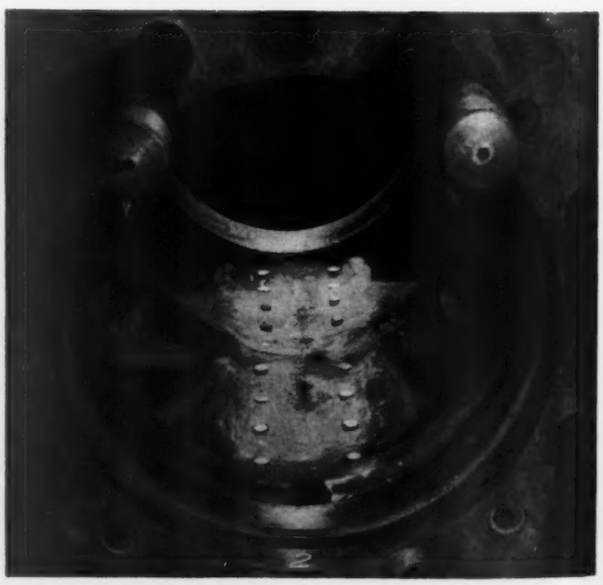
L. E. Grant tells of welding procedures developed for diesel locomotive maintenance

Welding and Cutting

The report of the Committee on Welding and Cutting was presented by L. E. Grant, engineer of tests, Chicago, Milwaukee, St. Paul & Pacific. The report is concerned primarily with welding procedure, and deals with repairing cracked truck frames and bolsters of diesel locomotives including general preparations, welding procedure for Grade A steel castings and low-carbon nickel steel castings and welding fabricated body bolsters.

It also offers procedure for supporting a locomotive body during welding operations, for welding cracks in water jackets of cast iron diesel engine blocks and describes the arc welding of a cast iron diesel engine base. The report includes a number of pictures illustrating these procedures.

Concerning the welding of cast iron engine blocks, the report states that cracks and leaks are caused by freezeups, erosion and cavitation due to high velocity flow of water at restricted points. Erosion, it adds, always takes place on the interior of the vertical outside wall of the water jacket on the camshaft side at the point where the cooling water flows between the outer wall and the cylinder liner. When the leak is caused by widespread pitting, the report states, repair by welding is not recommended, and consideration should be given to metal spraying or other methods. The report was presented at the close of a session and there was no discussion.



One of the several examples of welding described in the report. A defective diesel engine cylinder block showing crack on water side of jacket on camshaft side of No. 2 cylinder. Protruding screws are from plate application on the outside of casting. Crack is associated with corrosion pits

Next Meeting of the Section Will Be Held in June 1953

Secretary S. W. Marras reads the resolution announcing the Section's June 1953 Meeting

At the opening of the Wednesday, September 17 session, Chairman Finnemore announced that a resolution had been passed on the day previous at a meeting of the Committee of Direction. He called upon Secretary S. W. Marras to read it, and it reads as follows:

> "Be it resolved:
>
> 1. That it is the sense of the Electrical Section, Engineering and Mechanical Divisions in annual meeting assembled, that the Section hold its next annual meeting in Atlantic City, N. J., in June 1953, concurrently with the meeting of the Mechanical Division during the Pan American Railway Congress.
> 2. That this meeting be confined to three days with afternoon sessions on two days.
> 3. That these three days, preferably be Wednesday, Thursday and Friday, June 24, 25 and 26."

Car Air Conditioning

The report of the Committee on Car Air Conditioning Equipment was presented by A. E. Voigt, car lighting and air conditioning engineer, Atchison, Topeka & Santa Fe. Concerning the heating of passenger train cars, the report includes the following statement.

The heating systems in use on air-conditioned passenger train cars today are not entirely satisfactory. Many of the systems are too complicated, are difficult for maintenance personnel to understand and properly maintain, and involve altogether too many vulnerable features which cause failures, thus resulting in serious passenger complaints and unfavorable reactions to rail travel. Furthermore, the cost of maintenance is altogether too high. Emphasis should be placed on simplification of electrical control.

The most vulnerable and troublesome components of all heating systems are the following:

Thermostats.
Steam radiation admission valves.
Pressure regulating devices.

The report then proceeds to pursue the subject further by describing recently-developed, simplified heating systems. These are the Minneapolis-Honeywell "Economy" Moduflow Car Heating System and the Budd Steam Heating Equipment. The report also describes a Fulton Sylphon development in which mercury-tube type thermostats have been replaced by other types. One of these is a bi-metallic thermostat with quick make and brake characteristics and the other is liquid-filled element which operates a two-pole contactor.

Waste product heating of cars is being studied intensively by the Committee. It reports that there is little conclusive performance data yet available, but describes three systems as applied to a number of cars now in service. One of these is the heating system of Budd rail diesel cars, another is the Vapor waste product heating system as applied to Pennsylvania diners and a Louisville & Nashville business car, and the third an Atlantic Coast Line office car using General Electric equipment.

A. E. Voigt presents the report of the Committee on Car Air Conditioning Equipment

In all cases, the heat is developed by diesel engines used for driving electric generators. In the case of the Budd car, the engines also are the motive power for the car.

Mechanical refrigeration specifications have been developed in Assignment 5 of the report. These were drawn up to cover electro-mechanical refrigeration for drinking water only, and for combined units for food storage and drinking water purposes.

Recommended practice for the inspection and maintenance of standard Waukesha ice-engine air-conditioning equipment at maintenance terminals is developed in the report by sub-committee No. 7.

Concerning the location of thermometers in food boxes, the report states that due to the variation in construction of food boxes, it is difficult to make a recommendation in regard to the location of thermostats other than to recommend they should not be located too near the refrigerant coils, so as to avoid frost building up on and around the thermostats, resulting in unstable operation. The thermostats should also be in a path of moving air in the boxes. A thermometer of the type which may be mounted through the wall of the box with the temperature indicating dial on the outside, appears to be the most desirable. The dial should be calibrated in degrees and the actuating element of sufficient length to permit placement in the warmest zone in the box.

Specifications for air filter servicing machines constitute the final section of the report.

In presenting the report, Mr. Voigt said that new developments in heating equipment have disposed of nearly all the objections the railroads had.

J. L. Christen (Pullman Co.) questioned the use of the B. M. T. C. thermostat, saying that in his opinion, it is suitable for cooling but too slow for heating. W. J. Madden (Pennsylvania) replied that his road has used bi-metallic thermostats for heating, but that this has not been done in recent installations. They do not. he said, give as close control, and are at times erratic.

Asked if the new Minneapolis-Honeywell system were not oversimplified, R. H. Russell (G. N.) said his railroad has had one car equipped with the system for two years, and that there has been almost no maintenance. He did, he said, replace one electronic relay. W. J. Madden (Pennsylvania) said the Pennsylvania has 10 cars equipped with the system. He said that it must have a. c. power, but that he does not consider it to be oversimplified, and that installation has performed very well. E. M. Sanders (Minneapolis-Honeywell) said that the best guide is the operating experience of the railroads. Such systems, he said, are in operation on 18 railroads, some having been in service for four years. The major problems, he said, have been due to car wiring or mechanical faults in the piping system. R. Dougherty (U. P.) said that Union Pacific trouble is due largely to leakage in piping. A mixture of Prestone and water, he said, is hard to hold. When a system is tight, he said, it is very satisfactory, most leakages occurring in new installations.

During a general discussion of the characteristics of M.-H. Unizone and Moduzone heating systems, D. E. Jones (C. P.) said the Canadian Pacific has Moduzone systems in two roomette cars and that apart from a little leakage in valve seals, they have been highly satisfactory. He also said they provide better control in rooms than can be obtained with individual thermostats.

Mr. Voigt asked if the limited number of controls might cause trouble if a regulator should fail, and C. E. Impey (Vapor Heating Corp.) replied that if a control should fail, the system may be operated manually. Mr. Jones added the Canadian Pacific is trying to limit its Moduzone systems to two controls.

R. I. Fort (I. C.) asked if antifreeze is being used in Budd cars which require about 50 gal. of Coolant. W. J. Madden (Pennsylvania) said he could not answer for the Budd Company, but that the Pennsylvania uses Prestone on its eight diners. Asked about mixing antifreeze solutions, he said, those containing castor oil cannot be mixed with other types without danger of saponification.

W. S. Weff (F. E. C.) asked if the committee had given consideration to the question of making ice cubes on the cars. Mr. Fort replied that the Illinois Central has a large ice cube maker on its electric diner and said the problem of stripping the containers is considerable. They have, he said, tried various kinds of trays but without satisfactory results. When hot water is used, he said, half of the ice is lost. It is planned in the future, he said, to use a continuous type of cube maker. Mr. Weff said the Florida East Coast has also had trouble with cube makers. R. Dougherty (U. P.) said his railroad has no ice cube makers in cars, but that there are continuous cube makers in terminals for supplying cars. When of sufficient capacity, he said, they are too large for use in cars. Mr. Noyer (Pullman Company) said his company had supplied the Pennsylvania with ice cubes and added that new cars have enough power to make them, and in most much slower than the rate at which the thermostats act. Their cases, the car machine must be supplemented by ice from the terminal. Mr. Fort (I. C.) said the Illinois Central also supplies ice cubes from terminals, but that it is good to have some ice-making equipment on the car, and a large storage space for cubes. Asked about storing cubes on the car so they will not stick together, Mr. Fort said, the best protection is to keep the box as cold as possible.

R. I. Fort (I. C.) asked if the sub-committee, in recommending material for gears, had given any consideration to material other than steel. W. J. Madden (Pennsylvania) said the specifications set up were intended only to indicate optimum requirements and did not rule out other satisfactory materials.

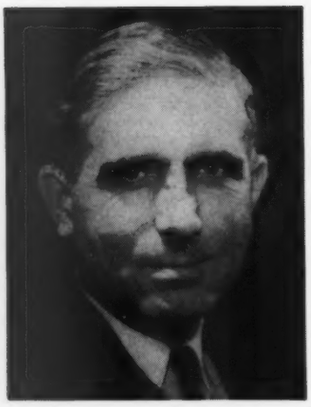
T. J. Kenny (Fulton-Sylphon) was asked if bi-metallic thermostats had proved satisfactory for car heating control and he replied that one road has been using them for three years, and another for two, without difficulty. In test, he said, they have operated for half a million cycles with a change of only one tenth of a degree. He said they have been used with 50 per cent-stepped heat control, and that the rate of rise in car temperature is much slower than the rate at which the thermostats act. Their operation, he said, takes about one-half minute longer than a mercury thermostat.

D. E. Jones (C. P.) asked if the committee members thought they should concern themselves with mechanical refrigeration of freight cars, and Chairman Finnemore said this will be explored by the Committee of Direction.

Repair Shop Facilities

The report of the Committee on Electrical Facilities and Practices for Repair Shops was presented by D. F. Dunsmore, assistant electrical engineer, Chesapeake & Ohio. A complete list of the operations required for the general overhaul of a traction motor is given in the report. This is followed by a report on Pennsylvania practices with a flow chart showing successive operations in the railroad's shop at Altoona, Pa.

Additions to the Santa Fe shop are listed in the third section of the report. These will be described more fully in a subsequent issue of this magazine. Several Rock Island shop equipment developments are also listed, and these too will be described in subsequent issues.



D. F. Dunsmore, Chairman of the Committee on Electrical Facilities and Practices for Repair Shops

The report includes a general discussion of the value and importance of seasoning commutators, a subject which is now receiving much attention.

Concerning the need for new shop facilities, the report asks for means of locating broken and craked strap armature coils, means of detecting faulty insulation on laminations, a low cost commutator seasoning machine, a power-driven positioner and a means of contour-grinding gears.

The committee's fourth assignment concerns equipment and methods for testing. The commonly-used methods of testing, such as Megger insulations and high-potential ground insulation testing are listed and reference is made to high-frequency voltage testing of insulation and to surge generator testing which has previously been described in *Railway Mechanical and Electrical Engineer.*

Low-Resistance Ohmmeter Testing

Reference to a new method of testing is made as follows:

There is available a low resistance ohmmeter with a direct indicating cross-coil ohmmeter for measuring low resistance by the fall-of-potential method. A current value preset between one and one hundred amperes at a potential of one volt is passed through the resistance under test through the hand prods of the test leads. The second contact on each prod is for potential readings in the path of the current.

Measurements of resistance from one-millionth of an ohm up to five ohms can be made. Testing on traction motors ordinarily falls in the 1000 or 10,000 microhm range and a low resistance ohmmeter with only these two ranges is available. The bar to bar resistance values can be compared. The resistance of joints between commutator bars and risers or between risers and coil ends at the front end of the armature or between back ends at the rear of the armature can be compared.

High-Voltage Testing

The following excerpt from the report covers a comparatively new and somewhat radical departure from conventional insulation testing methods. It is offered as information and for discussion without the specific endorsement of the committee.

A.c. voltages, because they are easily obtainable, are in common use for testing. In some cases d.c. voltages would be equally effective and often preferable.

It is a known fact that the higher values of alternating current stress causes deterioration of the insulation and the higher the voltage the more rapid is the deterioration. With d.c. overpotentials, the time to failure of insulation is much longer than with a.c. potentials. Every application of high voltage a.c. tends to shorten the life of the insulation. With d.c. testing, the progressive deterioration of insulation is improbable unless a defect already exists. Evidence available indicates that no damage to sound insulation will occur by the application of high voltage d.c. Laboratory tests (of one minute duration) on mica wrappers indicate that an average ratio of two or more for the d.c. to a.c. Peak voltage is required to cause a breakdown. Thus a d.c. voltage of comparable stress to an a.c. voltage will be a smaller percentage of d.c. strength of the insulation. This evidence sub-

stantiates the statement that the risk involved in using d.c. potentials is less than with a comparable a.c. test.

As an example, an a.c. test voltage of 1050 r.m.s. value is equivalent to a peak a.c. stress of 1485 volts. Thus a d.c. potential of 1485 volts would be equally searching to an a.c. voltage of 1050 with less risk of damaging good insulation. The acceptance of 1050 volts d.c. for testing would lower appreciably the possibility of damaging good insulation and at the same time meet the requirements for a test voltage of that value.

High voltage d.c. insulation test sets using the electronic technique are now on the market and can be supplied in several ranges of voltages. One 15 kv. test set has two voltage ranges 0-1.5 kv and 0-15 kv. with current ranges of 0-50 microamperes, 0-250 microamperes and 0-2500 microamperes.

The final section of the report lists specifications for a liquid electrical cleaner which are offered for discussion with the idea of eventually developing a specification for inclusion in the manual.

The discussion was opened by C. F. Steinbrink (C. R. I. & P.) who said that from the descriptions of diesel electrical shops which have been published, it would appear that most of them are larger than necessary. He said that next year, the committee will endeavor to develop an overall layout for such shops. They must be designed, he said, on the basis of what they will become.

C. A. McGough (Service Machine Tool Company) said the first question to answer is, should the railroad have a shop or not? Means, he said, have been developed to make this determination, and added that railroads fall into three categories.

F. M. Nelson (U.P.) called attention to the fact that the shop diagram in the report shows the degreaser in the building and asked if it should not be outdoors. He added that the time in the degreaser should be carefully controlled. Mr. Steinbrink replied that when the degreaser was first installed in the Silvis, Ill., Rock Island shop, it eliminated the need for about 15 men. The State Medical Association, he said, made many tests and decided the degreaser was not hazardous. Private investigators also made tests and drew the same conclusion. Leaving an armature in the degreaser for 10 minutes, and a frame for 7 or 8 minutes, he said, was about the limit since condensation of the vapor stops in this time. He said that motors in service on the Rock Island have been through the degreaser from 4 or 5, to as many as 24 times. It is necessary, he said, to use a satisfactory impregnating varnish.

Concerning unfulfilled shop requirements, Mr. Steinbrink said he did not know any way to detect cracks in armature coils and that there was need for a means of determining faulty insulation between core laminations.

R. I. Fort asked about the test stand for cooling fans, referred to in the report, and Mr. Steinbrink replied that it is for testing the motor, not the fan.

Mr. Steinbrink expressed the opinion that no railroad should rewind an armature without seasoning, and that it is difficult to obtain a suitable machine. Mr. McGough said this problem had come to the attention of his company about four years ago, and that they had produced 7 or 8 seasoning and grinding machines. At that time, he said, it was felt that only one machine per shop would be used. Now, he said, it appears that a railroad would use a number, not only for rewindings, but also for mileage check. His company, he said, is now working on a modified unit which would be a heating and spinning stand only.

Concerning the relative merits of d.c. and a.c. testing, J. W. Teker (General Electric Company) asked how important the former is in view of voltages used on diesel equipment. It is generally recognized, he said, that d.c. motors and generators operate on a.c. current and asked if the committee had taken into consideration the question of overstressing. D. F. Dunsmore (C. & O.) replied that the report does not have committee endorsement, and that the subject will be studied further.

A. L. Kelly (M.P.) said the real problem of cleaning is to find some means of doing it that does not require taking the equipment apart.

C. A. Williamson (T. & N. O.), the incoming chairman, reminded members that the next meeting would be held in June 1953 in Atlantic City, N. J., and said this means that the committee chairmen must start their work immediately. The circumstances, and the time, he said, offer a challenge to produce important material.

C. A. Wilson speaks before the Joint Meeting of the Electrical Section and the Locomotive Maintenance Officers Association

Automotive and Electric Rolling Stock

The report of the Committee on Automotive and Electric Rolling Stock was presented by C. A. Wilson, assistant general supervisor diesel engines, Atchison, Topeka & Santa Fe, and subcommittee chairmen before a joint meeting of the Electrical Section with the Locomotive Maintenance Officers Association.

The first part of the report lists locomotives and locomotive equipment developed recently by the several manufacturers.

The American Locomotive Company's contribution referred to is a 1,600-hp. road switcher equipped with six traction motors, and offered in a weight range from 270,000 lb. to 360,000 lb. It can be furnished with controls suitable for humping and it has adjustable current control for dynamic braking.

Baldwin-Lima-Hamilton developments mentioned include booster units for 1,600-hp. all-service locomotives, an 800-hp. switcher, a system of humping control which permits bringing the engine up to speed at practically no horsepower, improved field shunting, controllers, and a system for improving the performance of the all-service locomotives in the higher speed ranges. This is accomplished by short-circuiting the field of one of the three traction motors on each truck.

Electro-Motive developments referred to are the Model SD-7 six-motor, heavy-duty road switcher, and the MRS-1, six-motor, military road switcher. Other items are automatic sanding and a dynamic brake regulator which prevents overloading the dynamic brake equipment.

Fairbanks-Morse & Company, the report states, has an improved governor, a redesigned brake cooling system, a new exhaust snubber for the C line, and a dynamic-braking, over-voltage relay which prevents overloading of the dynamic brake equipment. Idling speed of the 1,200-hp. engine has been reduced from 350 to 300 r.p.m. with consequent savings in fuel.

The General Electric Company has, during the past year, supplied two 5,000-hp., 11,000-volt a.c., single-phase electric locomotives during the past year, and the first production design of the gas-turbine-electric locomotive has been placed in service on the Union Pacific.

Westinghouse contributions include further testing and development of its 4,000-hp. gas-turbine-electric locomotive, two 6,000-hp., 11,000 volt, a.c., single phase, ignitron type locomotives, using d.c. traction motors, and a 4,500-hp. steam-turbine-electric locomotive being constructed jointly by Westinghouse, Baldwin and Babcock & Wilcox for the Norfolk & Western. The gas-turbine and one of the electric locomotives have sliding bolster trucks.

Nickel-Cadmium Batteries

According to the report of a sub-committee, there are now 96 nickel-cadmium storage batteries in service on diesel locomotives on 22 railroads. Their performance is being studied.

Locomotive Standardization

Standardization of electrical equipment for switching locomotives is being studied. At present a sub-committee is working

on magnet valves, fuel pump motors, cab heaters, defrosters and fractional horsepower motors.

Lead-Acid Storage Batteries

A section of the report on lead-acid storage batteries and compartments for diesel-electric locomotives recommends 420-amp.-hp. (8-hr. rate) batteries with a 1,250 specific gravity for 600-hp. and larger switchers. For road service locomotives having engines from 600 to 2,250 hp., 420-amp.-hr. batteries are recommended. This section of the report also proposes dimensional data for the batteries, properties of hard rubber containers, dimensions of containers and battery compartments, arrangement of containers and means of ventilating battery boxes.

Utilization of Locomotives

Assigned to study maximum utilization of diesel electric locomotives, Sub-Committee C has developed an excellent explanation of why a locomotive behaves as it does with different motor connections, with different gear ratios, with motors and generators of various ratings and with different numbers of motors.

Among other things it explains one thing which is quite generally misunderstood—why a change of gear ratio does not change the speed-tractive force characteristics of a locomotive.

Wheel Slip

Section 4 of the report sets up requirements for wheel slip protective devices. It says, for example, that a detector should be available for all types of locomotives which will give positive indication and protection against (1) wheel slip during acceleration and high speed; (2) wheel slide protection during air and dynamic braking; (3) locked wheel protection.

Due to the different types of diesel-electric locomotives in the service today, this positive protection can be ammoplished by the application of axle-mounted equipment and this can be made standard on all types of locomotives used in all classes of service.

The wheel slip and wheel slide protection device should consist of the following:

1. Axle mounted equipment
2. Relay panel
3. Alarm system

Further details of these specifications are included in subsequent paragraphs.

Battery Charging

The report states that there is much need for preventing battery failures caused by improper charging. On some roads, these have been sharply reduced by training crews to watch battery charging ammeters. Two roads employ battery charging alarm circuits which are included in the report, but the report states these only advise the operator that the battery is not being charged and do not prevent failure. The Electro-Motive Division, the report states is now putting on the market a modification of its present regulator to correct the cause of such failures.

The Santa Fe is now equipping its E.M.D. locomotives with battery trainline receptacles and switches and drawings for these were distributed by the chairman to those who wanted them.

Location of Receptacles

Sub-Committee G is attempting to standardize the location and arrangement of receptacles and jumpers on diesel-electric locomotives. Its report is a general discussion of the subject which includes information on existing practices.

Alarm Signals, Lights and Bells

In making a study of indicating signals on diesel locomotives, by Sub-Committee H, a tabulation was made of replies received from the chief mechanical officers indicating their preference as to function and location of visual and audible alarms. From the tenor of these replies, the majority preference indicates that the following represents a minimum which should be expected, where applicable, from the manufacturers of road diesel-electric locomotives.

1. Color light signals at engine control panel with audible alarm in all units:
   (a) Low lube oil pressure (yellow)
   (b) Hot engine (red)
   (c) Ground relay operated (white)
   (d) Steam generator failure (green)
   (e) Traction motor blower, radiator fan or alternator failure
   (f) Crankcase exhauster (yellow)
   (g) Battery charging indicator (white)
2. Trainlined color light signals and buzzer in operating cab:
   (a) Low lube oil pressure (yellow)
   (b) Hot engine (red)
   (c) Ground relay operated (white)
   (d) Steam generator failure (green)
3. Trainlined color light signal at control position and buzzer in operating cab:
   (a) Dynamic brake limit (white)
5. Color light signal at control position:
   (a) Power-off (*PC*) switch operated (white)

Each light aspect shall be marked clearly.

Any railroad may add other signals to meet its individual requirements.

The same sub-committee has under consideration a standard load ammeter and offers an opinion on what it should be. It also investigated shut-down switches and discovered they are commercially available.

Ground Relays

Because many railroads feel that ground relays are too sensitive, Sub-Committee I explored the subject and reported that it appears impracticable to set a pick-up value because of different locomotive designs, different operating conditions and because of the various climates in which they must operate. It also reports that the Pennsylvania is installing surge relays in the generator field circuits on two makes of diesel locomotives to protect main generator against flashovers. The generators are being excessively damaged by flashovers due to lack of any inherent ability of the generator to remove excitation when trouble develops. The ground relays will not respond to a flashover until a serious ground develops from the flash. The surge relay picks up before serious burning of the generator results.

Dust Elimination

To reduce trouble which may be caused by dust in electrical control equipment, Sub-Committee J has the following to offer:

The desirability of eliminating dust from electrical control equipment is very great, but the possibilities are so limited due to the fact that a great number of resistors are mounted in control cabinets with relays, contactors and power switches and should have a circulation of air around them in order to dissipate the heat properly.

It is obvious that control equipment cabinets must be ventilated but any improvement in dirt conditions requires the filtering of the cooling air.

It is recommended that the control equipment cabinets be located convenient to a source of air supply such as traction motor blowers so that air can be circulated through the cabinets. The cabinets should have the control devices grouped so air can be circulated around them and all resistors should be placed in a separate cabinet or outside the present cabinet. The usual amount of dirt which collects on these resistors would not be considered harmful. All cabinet doors should have some sort of flexible seals and a sturdy spring loaded type of latch should be provided to keep the doors closed tightly.

We believe that much can be done in the way of eliminating dust, dirt and moisture from the electrical cabinets. This study is not complete at this time due to the many problems involved.

At the request of Chairman Finnemore, Secretary Marras reread the resolution passed by the Electrical Section on the previous day, by which it was determined that the next meeting of the Section will be held in Atlantic City, N. J., June 24, 25 and 26, 1953.

Officers Coordinated Mechanical Associations 1952-53

Committee of Coordinated Mechanical Associations

Chairman: J. P. Morris, general manager —mechanical, Atchison, Topeka & Santa Fe.

F. K. Mitchell, manager equipment, New York Central System.

J. L. Robson, general superintendent motive power, Great Northern.

(Committee includes also the president and secretary of each of the coordinated associations.)

Air Brake Association

President: R. F. Thomas, general air-brake instructor, Canadian Pacific.

First vice-president: C. V. Miller, general supervisor of air brakes, New York, Chicago & St. Louis.

Second vice-president: D. R. Collins, superintendent air brakes, Denver & Rio Grande Western.

Third vice-president: R. J. Dewsbury, general air-brake inspector, Chesapeake & Ohio.

Secretary-treasurer: Lawrence Wilcox.

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John Mattise, superintendent air equipment, Chicago & North Western.

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Vice-presidents:

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E. E. Packard, district master car repairer, (general shops) Southern Pacific Los Angeles.

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L. Richardson, president, Rutland.

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Vice-President: F. R. Milligan, general boiler inspector, Canadian Pacific.

Secretary-Treasurer: Albert F. Stiglmeier, general supervisor of boilers and welding, New York Central System.

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W. H. Keiler, locomotive inspector, Interstate Commerce Commission.

A. A. Edlund, general boiler inspector, Chicago, Milwaukee, St. Paul & Pacific.

Floyd R. Seeley, general boiler inspector, Union Pacific.

Bernard C. Wollard, system mechanical and boiler inspector, Chicago & North Western.

R. A. Culbertson, general master boilermaker, Chesapeake & Ohio.

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Second vice-president: T. T. Blickle, mechanical superintendent, Coast Lines, Atchison, Topeka & Santa Fe.

Third vice-president: J. T. Daley, superintendent motive power, Alton & Southern.

Fourth vice-president: F. Thomas, assistant to general superintendent equipment—diesel and electric, New York Central.

Secretary-treasurer: C. M. Lipscomb, assistant to schedule supervisor, Missouri Pacific.

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W. E. Lehr, superintendent motive power, Lehigh Valley.

A. E. Rice, chief mechanical officer, Denver & Rio Grande Western.

C. J. Wolfe, superintendent motive power, Western Maryland.

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J. C. Stump, chief mechanical officer, Chicago & North Western.

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Vice-presidents:

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E. L. Reeves, trainmaster, Baltimore & Ohio Chicago Terminal.

T. J. Conway, fuel supervisor, Texas & Pacific.

Secretary-treasurer: L. H. Peters.

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G. B. Curtis, road foreman of engines, Richmond, Fredericksburg & Potomac.

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T. L. Henley, chief fuel supervisor, Missouri-Kansas-Texas.

F. G. LaMaster, system fuel supervisor, Chicago, Burlington & Quincy.

R. R. Rich, road foreman of equipment, Chicago, Rock Island & Pacific.

J. S. Swan, supervisor locomotive operation, Louisville & Nashville.

C. P. Patterson, regional fuel supervisor, Canadian National.

O. D. Teeter, fuel supervisor, Denver & Rio Grande Western.

C. M. Moddrell, system supervisor fuel and locomotive performance, Nor. Pac.

J. R. Weller, supervisor locomotive operation, Baltimore & Ohio.

Electrical Section Engineering and Mechanical Divisions Association of American Railroads

Chairman: C. A. Williamson, electrical engineer, Texas & New Orleans.

Vice-chairman: R. I. Fort, diesel instructor, Illinois Central.

Secretary: S. W. Marras.

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K. H. Gordon, assistant electrical engineer, Pennsylvania.

L. E. Grant, engineer of tests, Chicago, Milwaukee, St. Paul & Pacific.

P. B. Burley, superintendent of communications and electrical engineer, Illinois Central.

H. A. Hudson, signal and electrical superintendent, Southern.

John Leisenring, electrical superintendent, Illinois Terminal.

S. B. Pennell, assistant engineer, New York Central.

D. M. Burckett, electrical engineer, Boston & Maine.

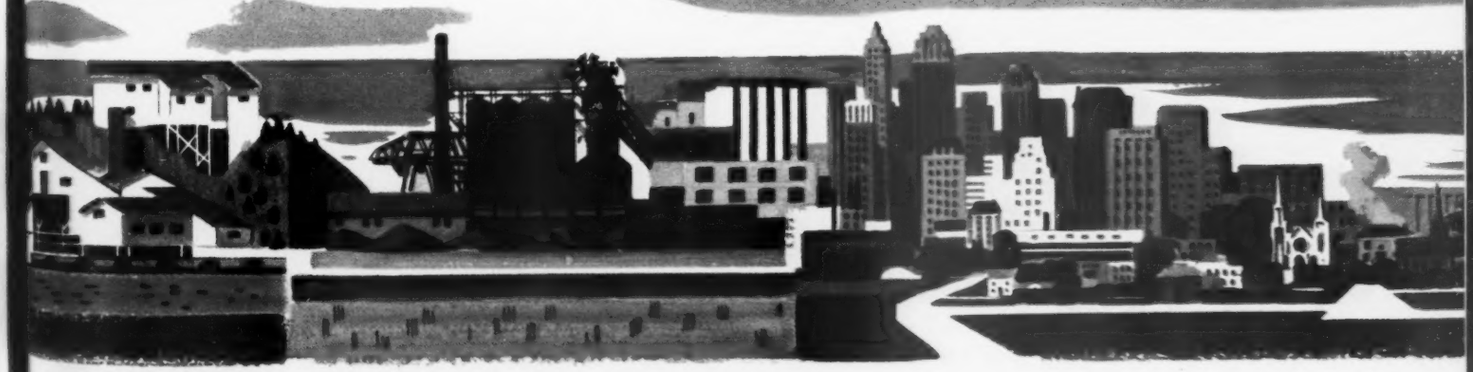
E. J. Feasey, general supervisor of diesel equipment, Canadian National.

S. R. Negley, electrical engineer, Reading.

Today's remaining opportunities to cut operating costs substantially demand a diesel locomotive of truly universal application. Continuing to lead progress in the motive power field, Fairbanks-Morse now fills that need by presenting — the Train Master.

TM — that is the symbol for the new Fairbanks-Morse 2400 horsepower engine, six-axle, six-motor diesel locomotive. Train Master is a *new* locomotive . . . new in performance . . . new in efficiency and economy.

Watch for the Train Master — the newest name in railroading that brings new opportunity for greater operating efficiency in all classes of service. Fairbanks, Morse & Co., Chicago 5, Ill.



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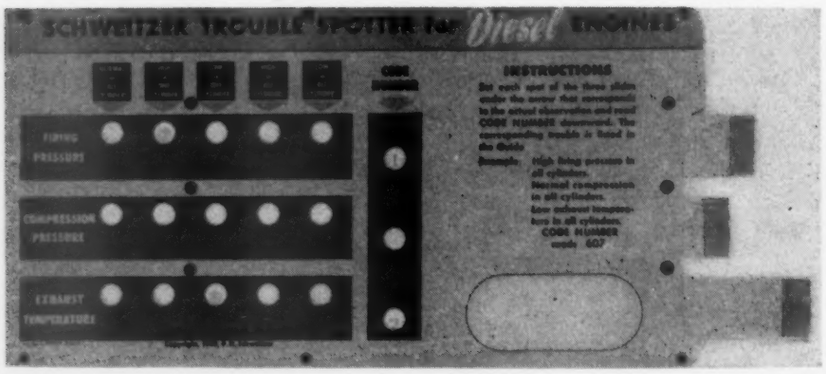
DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY • PUMPS • SCALES
RAIL CARS • HOME WATER SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS

NEW DEVICES



Diesel Engine Trouble Spotter

A new method of analyzing and solving operating difficulties of diesel engines has been marketed in the form of an easy to use Spotter and Guide. The Spotter is a slide rule type of indicator and the Guide is a booklet containing remedies indicated by the Spotter.

Three slides on the indicator, available from Dieselspotter, Fanwood, N. J., show the firing pressure, compression pressure and exhaust temperature conditions. The setting shows a code number which is referred to in the Guide for a non-technical analysis of the trouble and the steps necessary to effect a remedy.

The device is 4¼ by 8¼ in., is protected against water, oil, dust and grime by a transparent acetate envelope.

High-Voltage D. C. Insulation Tester

A device for performing a type of testing, new in railroad practice, called the Takk high-voltage d.c. insulation test set, has been introduced by the John Hewson Company, 106 Water street, New York 5. The primary purpose of the set is to detect insulation weakness before breakdowns occur and thus prevent failure of high voltage electrical apparatus in service. The test set is being used for dielectric-absorption tests, over-potential tests and specific fault location on motors, generators, transformers, cables, etc.

For dielectric absorption tests full operating voltage for the equipment under test is applied for ten minutes while readings of insulation leakage current are taken every fifteen seconds. A curve may be plotted of the current values against time, any variation of this curve from one test period to another indicating an impairment of the condition of the insulation.

For an over-potential test, the applied voltage is increased steadily to the desired test voltage and held there for one minute. The manufacturer states that excessive leakage current readings normally occur well before the point where breakdown of weak insulation might occur. Apparatus passing this one minute over-potential test may be returned to full operating load without further test for at least one year without undue risk.

The manufacturer also states that when used for specific fault location, the d.c. test is less harmful to insulation than an a.c. test.

The test set shown in the illustration is a 45 kv. multirange unit, with three voltage scales of 0-1.5 kv., 0-15 kv. and 3-45 kv. Three current ranges are also supplied of 0-50, 0-250, and 0-2,500 microamperes. It is operated from a 115-volt, 60-cycle power source. The set measures 15 in. by 22 in. by 34 in., and weighs 130 lb. The direct current is produced by cold cathode diode rectifier tubes, which require no filament warm-up time before impressing full voltage on them. The test set is not damaged when a dead short is encountered in the apparatus under test.

Corrosion Protection Without Coatings

It is a powder-like substance to provide protection under high humidity conditions against rust without coating, to reduce the cost of packaging metal parts and protect them during storage and shipment. Known as VPI, it is a volatile amine nitrate and has been marketed by the Shell Oil Company, New York 20.

The formulation can be applied by placing it in a crystal form in a package containing parts to be protected or by dissolving it in a water or alcohol solution and spraying it on the parts. This substance is required in very small quantities and protects by giving off a vapor which is carried to the metal where is condenses to provide a thin film.

Snap-Around Portable Meter

The Amprobe 300, a new pocket-size voltammeter with nine ranges up to 300 amp. and 600 volts, has been introduced by the Pyramid Instrument Corporation, Lynbrook, N. Y. It is of the snap-around type, which enables the user to measure current instantly without shutting down equipment or making ammeter connections.

The instrument covers nine ranges: 0-6, 0-15, 0-30, 0-60, 0-150, and 0-300 amp. a.c., and 0-150, 0-300, and 0-600 volts a.c. Voltage test leads are equipped with a new retractable safety plug, which automatically insulates itself when removed from the meter. Jaws are completely insulated down into the sockets, protecting against shorts and shocks. Probe jaws are pointed for working in crowded switch and terminal boxes. A no-rim window lights the meter scale to the edges. It is pocket-size and also fitted for belt-mounting.

ESSO COBLAX

"Tailor-made" to railroad specifications

ESSO COBLAX LUBRICANTS

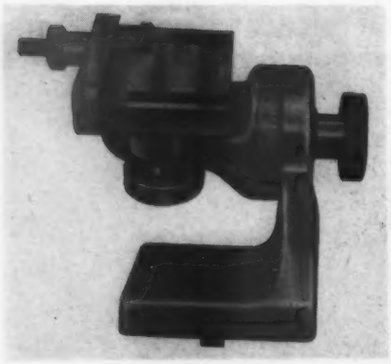
have been specifically developed to provide highly dependable gear lubrication for traction motor drives on electric and diesel-electric locomotives; gas electric and multiple-unit cars; and many other locomotive and car lubrication requirements. Esso COBLAX is available in a wide range from fluid oils to semi-solid products... "tailor-made" for railroad applications.

BACKED BY CONSTANT RESEARCH

— keeping pace with latest engine design and developments. Esso Railroad Products are constantly being tested and improved.

BACKED BY CONSTANT FOLLOW-UP

— on-the-job check ups by Esso Sales Engineers assure dependable performance of Esso Railroad fuels and lubricants! Be sure to call on ESSO for any fuel or lubricating problem.



Chaser Grinding Attachment

This fixture is used to grind the compound rake and lead angles which are essential in the production of accurate, well-formed threads. It can be adapted for utilization of any grinding machine which has a traversing table regardless of the type of grinding wheel.

The base of the device can be clamped to a T-slotted table or in a magnetic chuck. Its platen can be rotated throughout a 360 deg. circle to provide a means of producing the desired lead angle.

Known as the No. 20 Fixture, and introduced by the Landis Machine Company, Waynesboro, Pa., it covers chaser widths from 1¼ to 4⅜. The unit can also be used for chaser widths from ⅞ to 1¼ in. by the addition of a grinding block.

Non-Spattering Machinery Oil

May be used in almost all applications requiring a general-purpose machinery oil. It is of special value for hand-oiled machinery, where the oil tends to drip off the moving parts.

This product is a tacky, mobile fluid, having a viscosity approximately that of SAE-30. It is a mineral oil processed for metal adhesiveness and contains 100% petroleum materials. Known as Kling-Oil, it was developed by Magnus Chemical Company, Garwood, N. J.

The properties of the oil are useful in the lubrication of machines having a multiplicity of moving parts where the retention of lubricant to avoid dripping and spatter is important. Its tackiness remains unchanged in service. No gumming, drying or building up is experienced after continued use.

Steel Strap Anchors For New or Old Cars

Steel strap load anchors of a type recently developed and placed on the market by the Keystone Railway Equipment Company, 80 East Jackson boulevard, Chicago 3, are easily installed by car shop workmen with simple equipment and without special skill. They can be applied to any car of standard design, either new or old, as it is not necessary to remove or renew car lining in making the application. No special sections need be used or anything left off or added during the building procedure.

Holes in the side lining the exact size of the anchor are the first requirement and quickly made by a wood router and steel templet. The templet is placed on the side lining in line with the side post and secured with a few nails. All holes in the lining at each post are cut with one templet setting; time required, 12 to 20 sec. per hole. The routers are loaned to railroads applying Keystone load anchors. On the job instruction in use of the router, templet making and anchor application are supplied.

After holes in the lining are cut, the anchors, which are malleable iron castings double coated with a rust inhibitor are driven into a tight taper fit in the side lining with a few hammer blows. The anchor is then securely held in place with blind rivets or welded stud bolts and nuts.

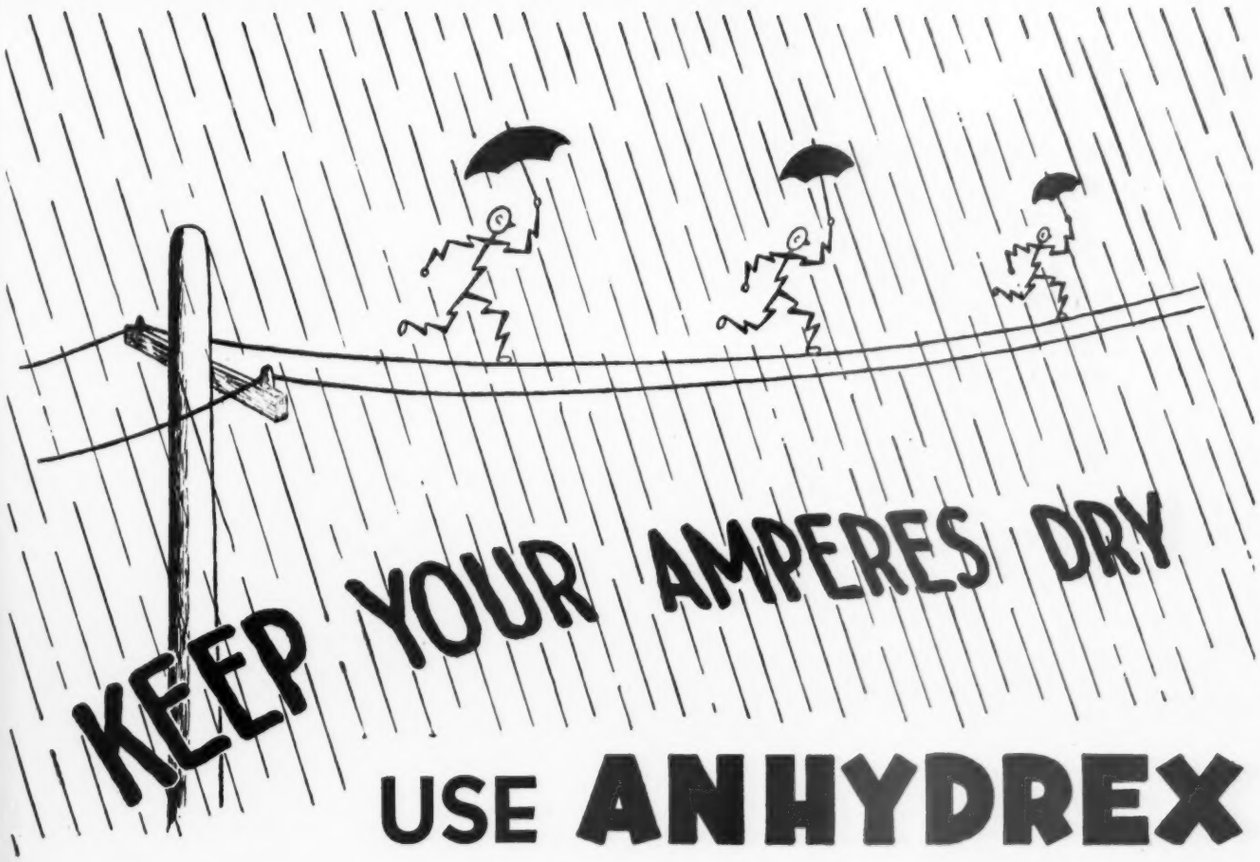
In the car illustrated the Keystone load anchors were applied at alternate side posts, six per post, or a total of 48 anchors per car. By the use of steel strapping applied through these anchors to sectionalize and tie partial loads in place, lading damage is largely prevented and crating and blocking expense minimized.

Plastic Dot Work Glove

A saving of over 40 per cent to users of canton flannel work gloves has been made possible, according to the manufacturer, by the application of plastic dots perma-

(Continued on page 154)

Left—Use of wood router and steel template in cutting accurate holes for load anchors. Center—Drilling blind rivet holes through steel side-post flange. Right—Load anchors riveted in place flush with inside lining.



USE ANHYDREX

Water in some form or other causes more interference with satisfactory cable service than any other one thing. Even small amounts of moisture finding their way into cables can put important power circuits out of business.

Cables in ducts are nearly always exposed to water. Even aerial cables can suffer from water. That is why you should use ANHYDREX cables to keep your amperes dry. With Simplex Anhydrex rubber insulation you need not use a lead sheath. ANHYDREX cables will function satisfactorily even under the wettest conditions.

You can avoid cable troubles on your important feeder circuits by using Simplex Anhydrex insulation on your cables. In that way you assure yourself that your amperes will always be dry. If you would like to know more about this dependable, long-lived insulation, simply send a request to the address below.

SIMPLEX ANHYDREX

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

NEWS

Davidson Retires from Loco. Inspection Bureau

EDWARD H. DAVIDSON retired on September 30 from the directorship of the Bureau of Locomotive Inspection of the Interstate Commerce Commission after 38 years of service with the bureau. He plans to enter consulting work at Washington, D. C., where he is a licensed mechanical engineer.

The bureau directorship is a position filled by Presidential appointment with confirmation by the Senate. With the retirement of Mr. Davidson, the commission designated one of the two assistant directors, Allyn C. Breed, as acting director.

Mr. Davidson had been director since June 1949, when his appointment by President Truman was unanimously confirmed

Edward H. Davidson

by the Senate. His retirement was pursuant to Civil Service retirement rules, as he became 70 years of age on September 26.

Mr. Davidson was born at Monroe, Conn., and his family later moved to Baraboo, Wis., where he attended public schools. His first employment was with the Chicago & North Western as an engine wiper and apprentice. He was subsequently employed by the Baltimore & Ohio as a machinist, and by the Central of New Jersey in various capacities, including those of machinist, engineman, and enginehouse foreman.

Mr. Davidson then left railroad service to become master mechanic for Milliken Bros. Steel Corporation. He came back as a locomotive engineer on the Southern. Next, he spent several years in Panama, where he was employed by the Panama Canal Commission's Transportation Department.

It was on October 23, 1914, that Mr. Davidson joined the staff of the Bureau of Locomotive Inspection as district inspector. He continued in that capacity until May 1940, when he became assistant chief inspector by appointment of the late President Roosevelt. The title of assistant chief inspector was subsequently changed to assistant director, and Mr. Davidson remained in that position until his appointment to the directorship. He is a member of the American Society of Mechanical Engineers, Master Boilermakers Association, Locomotive Maintenance Officers' Association, and Brotherhood of Locomotive Engineers.

A.S.M.E. Annual Meeting

THIS year's annual meeting of the American Society of Mechanical Engineers will be held at the Hotels Sheraton and McAlpin, November 30 to December 5, inclusive. Those sessions during the annual meeting program of particular interest to railroad men are shown below.

In conjunction with the annual meeting, the twentieth National Power Show, an exposition of power and mechanical engineer-

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.		Month of June 1952	Month of June 1951	6 months ended with June 1952	6 months ended with June 1951
3	Road locomotive miles (000) (M-211):				
3-05	Total, steam	14,705	23,574	107,147	157,845
3-06	Total, Diesel-electric	26,449	22,744	158,862	128,599
3-07	Total, electric	697	836	4,654	4,962
3-04	Total, locomotive-miles	41,890	47,155	270,768	291,426
4	Car-miles (000,000) (M-211):				
4-03	Loaded, total	1,502	1,706	9,763	10,336
4-06	Empty, total	860	871	5,360	5,168
6	Gross ton-miles-car, contents and cabooses (000,000) (M-211):				
6-01	Total in coal-burning steam locomotive trains	24,528	42,232	191,067	271,795
6-02	Total in oil-burning steam locomotive trains	8,161	11,960	49,094	73,289
6-03	Total in Diesel-electric locomotive trains	71,517	63,840	439,319	359,693
6-04	Total in electric locomotive trains	1,925	2,298	12,967	13,627
6-06	Total in all trains	106,275	120,337	692,892	718,499
10	Averages per train-mile (excluding light trains) (M-211):				
10-01	Locomotive-miles (principal and helper)	1.03	1.04	1.04	1.05
10-02	Loaded freight car-miles	39.00	40.10	39.50	39.40
10-03	Empty freight car-miles	22.40	20.50	21.70	19.70
10-04	Total freight car-miles (excluding caboose)	61.40	60.60	61.20	59.10
10-05	Gross ton-miles (excluding locomotive and tender)	2,763	2,827	2,806	2,739
10-06	Net ton-miles	1,229	1,331	1,291	1,282
12	Net ton-miles per loaded car-mile (M-211)	31.50	33.20	32.70	32.50
13	Car-mile ratios (M-211):				
13-03	Per cent loaded of total freight car-miles	63.60	66.20	64.60	66.70
14	Averages per train hour (M-211):				
14-01	Train miles	17.90	17.10	17.60	16.90
14-02	Gross ton-miles (excluding locomotive and tender)	48,804	47,773	48,811	45,775
14	Car-miles per freight car day (M-240):				
14-01	Serviceable	42.60	46.00	44.80	46.10
14-02	All	40.40	43.80	42.60	44.00
15	Average net ton-miles per freight car-day (M-240)	810	963	899	953
17	Per cent of home cars of total freight cars on the line (M-240)	47.70	39.20	43.60	36.60

PASSENGER SERVICE (DATA FROM I.C.C. M-213)

3	Road motive-power miles (000):				
3-05	Steam	6,391	9,601	44,036	64,126
3-06	Diesel-electric	18,890	16,279	109,143	94,835
3-07	Electric	1,581	1,613	9,803	9,697
3-04	Total	26,662	27,493	162,989	168,658
4	Passenger-train car-miles (000):				
4-08	Total in all locomotive-propelled trains	268,803	269,456	1,622,687	1,630,372
4-09	Total in coal-burning steam locomotive trains	31,414	49,409	229,745	336,856
4-10	Total in oil-burning steam locomotive trains	25,912	33,232	156,142	199,615
4-11	Total in Diesel-electric locomotive trains	194,124	169,813	1,127,894	990,609
12	Total car-miles per train-miles	9.85	9.61	9.76	9.51

YARD SERVICE (DATA FROM I.C.C. M-215)

1	Freight yard switching locomotive-hours (000):				
1-01	Steam, coal-burning	621	1,132	5,166	7,057
1-02	Steam, oil-burning	161	229	1,007	1,160
1-03	Diesel-electric[1]	2,839	2,904	18,629	17,334
1-06	Total	3,643	4,290	24,942	26,607
2	Passenger yard switching hours (000):				
2-01	Steam, coal-burning	24	43	182	302
2-02	Steam, oil-burning	10	12	68	78
2-03	Diesel-electric[1]	251	240	1,531	1,436
2-06	Total	317	328	1,981	2,017
3	Hours per yard locomotive-day:				
3-01	Steam	5.80	7.40	7.00	8.00
3-02	Diesel-electric	14.90	17.10	16.40	17.50
3-05	Serviceable	13.10	14.10	14.30	14.50
3-06	All locomotives (serviceable, unserviceable and stored)	11.20	12.20	12.40	12.50
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.69	1.74	1.77	1.77
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	0.73	0.76	0.76	0.77

[1] Excludes B and trailing A units.

Bending Sheet Metal and Steel Plate

Single Pieces or Quantity Runs

Boxes, cabinets, channels, angles, etc. are made in railroad shop in record time.

One of two pieces of rectangular-to-round transition, 11 partial bends are made on each corner. Time per piece, approximately 7 minutes.

These two typical installations in railroad shops show the versatility of the CHICAGO Power Bending Brake for bending sheet metal and steel plate. Single and any number of duplicate pieces can be formed in record time without the use of dies. And only a few minor adjustments are required to change from one job to another. The ease, speed, and safety of operation make the CHICAGO Power Bending Brake an economical method for handling a large variety of bending work.

Investigate the many possibilities of the CHICAGO Power Bending Brake. Many standard models offer a choice of capacity up to 14-foot length of bend in ¾-inch plate.

For complete story of the CHICAGO Bending Brake with performance data on a variety of bending, ask for Bulletin P-51.

DREIS & KRUMP MANUFACTURING COMPANY
7414 S. Loomis Blvd., Chicago 36, Ill.

CHICAGO
STEEL BENDING BRAKES
BOX and PAN BRAKES
PRESS BRAKES

Order EX-CELL-O Pins and Bushings *From Stock!*

FOR LOCOMOTIVES, PASSENGER AND FREIGHT CARS

If your railroad pins and bushings are among Ex-Cell-O's wide range of standard sizes, you can save money and expedite delivery by ordering directly from stock. You'll get highest quality materials and workmanship, as evidenced by the fact that more than 200 railroads and equipment builders depend on Ex-Cell-O for hardened and ground steel pins and bushings. Order them directly from the convenient Ex-Cell-O Catalog.

Unless your copy of the Ex-Cell-O Catalog of pins and bushings is in plain sight on top of your desk, better send for another copy today! Ask for Bulletin 32381.

RAILROAD DIVISION
EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

ing equipment, will be held at the Grand Central Palace, New York, December 1 to 6, inclusive.

MONDAY, DECEMBER 1

2:30 P.M.

Gas Turbine Power (II)—Fuels (II)—Power (II)

Residual Fuel-Oil Ash Corrosion, by B. O. Buckland, C. M. Gardiner, and D. G. Sanders, General Electric Co.

The Use of Residual Fuel Oils in Gas Turbines, by Philip Draper, Shell Petroleum Co.

TUESDAY, DECEMBER 2

9:30 A.M.

Fuels (IV)—Power (IV)

Combustion of Pulverized Coal in Water-Cooled Radiant Tubes, by R. A. Herman, Battelle Memorial Institute; T. R. Sawyer, Steam Locomotive Research Institute, and G. E. Keinath, Battelle Memorial Institute

The Development of a Vaporizing Oil Burner, by J. A. Johnson and E. H. Eustis, Thermal Research & Engineering Corp.

Pulverized-Coal Gasification—Ruhrgas Processes, by Kurt Traenckner, Essen, Germany

2:30 P.M.

Oil and Gas Power (I)—Railroad (I)

Crankcase Explosions, by Experimental Department, Fairbanks, Morse & Co.

Combustion of a Low-Volatility Fuel in a Turbo-Jet Combustion Chamber-Effects of Fuel Vaporization, by Phil Myers, University of Wisconsin

GAS TURBINE POWER (IV)

Temperature and Gas-Analysis Surveys in the Combustion Zone of Gas-Fired Gas-Turbine Combustors, by R. L. Riehe, Westinghouse Research Laboratory

Fuel-Spray Examination Methods, by F. C. Engel, Westinghouse Research Laboratory

Industrial-Type Oil- and Gas-Fired Combustion Chambers, by Samuel Letvin, Thermo Products, Inc.

WEDNESDAY, DECEMBER 3

12:15 P.M.

Fuels Division Luncheon. Subject: Fuels in a Technical Economy, by Frederic O. Hess, president, Selas Corporation of America.

2:30 P.M.

Oil and Gas Power (IV)—Railroad (III)—Lubrication (I)—A.S.T.M.

Diesel Maintenance Control by Spectrographic Means, by Harold R. Sennstrom, American Locomotive Co.

Diesel Lubrication—Oil Performance as Related to the Electron Microscope, by Ray McBrian, Denver & Rio Grande western.

7:30 P.M.

Annual banquet.

THURSDAY, DECEMBER 4

9:30 P.M.

Railroad (IV)

Survey-Progress in Railway Mechanical Engineering, 1951-52, by T. F. Perkinson, General Electric Co.

A Method for Determining Stresses and Vibration Data in Brake Beams Under

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE OCTOBER ISSUE

DIESEL-ELECTRIC LOCOMOTIVE ORDERS

Road	*No. of units*	*Horsepower*	*Service*	*Builder*
Alaska	6[1]	1,500		Electro-Motive
Canadian Pacific	10A[2]	1,500	Road	General Motors Diesel Ltd.
	4B[2]	1,500	Freight	General Motors Diesel Ltd.
	14[2]	1,500	Road Switchers	General Motors Diesel Ltd.
	6[2]	1,200	Switchers	General Motors Diesel Ltd.
	2A[3]	1,600	Road	Montreal Loco. Wks.
	10A[3]	1,600	Freight	Montreal Loco. Wks.
	2B[3]	1,600	Road	Montreal Loco. Wks.
	6B[3]	1,600	Freight	Montreal Loco. Wks.
	4[3]	1,000	Switch	Montreal Loco. Wks.
	5[3]	660	Switch	Montreal Loco. Wks.
	6A[3]	1,600	Freight	Canadian Loco, Co..
	4B[3]	1,600	Freight	Canadian Loco, Co.
Central of Georgia	12[3]	1,600	Road switch	Alco-G.E.
	4[3]	1,200	Switchers	Baldwin-Lima-Hamilton
	4[3]	1,200	Switchers	Electro-Motive
	4[3]	1,200	Switchers	Fairbanks, Morse
Delaware, Lackawanna & Western	6	1,600	Road switch	Fairbanks, Morse
Louisville & Nashville	4B[4]	1,500	Road freight	Electro-Motive
	30[4]	1,500	General purpose	Electro-Motive
	2[4]	1,200	Switch	Electro-Motive
	2A[4]	1,600	Road freight	Alco-G.E.
	7[4]	1,600	Road switch	Alco-G.E.
	4[4]	1,000	Switch	Alco-G.E.

FREIGHT-CAR ORDERS

Road	*No. of cars*	*Type of car*	*Builder*
Central of Georgia	25[3]	70-ton covered hopper	Pullman-Standard
Chicago, Burlington & Quincy	1	125-ton flat	Company shops
Duluth, Missabe & Iron Range	500[5]	70-ton ore	Pullman-Standard
International-Great Northern-St. Louis, Brownsville & Mexico	1,000[7]	50-ton box	Company shops
Lehigh Valley	100[9]	70-ton steel cov'd. hop'r	Bethlehem Steel
Merchants Despatch Transportation Corp. and Northern Refrigerator Line	1,000[9]	40-ton refrigerator	M.D.T. shops
Missouri Pacific	1	Flat	Company shops
North American Car Corporation	75	70-ton covered hopper	Pullman-Standard
Reading	1[10]	245-ton flat	Company shops
	1[10]	1250-ton flat	Company shops
St. Louis-San Francisco	1	125-ton flat	Company shops
St. Louis-Southwestern	1	125-ton flat	Company shops
Southern Pacific	1,000[11]	70-ton flat	Company shops
	800	50-ton gondola	Company shops
	100	70-ton gondola	Company shops
	100	50-ton pulpwood	Company shops
Toledo, Peoria & Western	25[12]	50-ton box	Pullman-Standard
Texas Mexican	25[12]	50-ton box	American Car & Fdry.
	30[12]	70-ton gondola	Pullman-Standard
	5	70-ton hopper ballast	Pullman-Standard
Union Tank Car Co.	600	50-ton tank	Company shops

PASSENGER-CAR ORDERS

Road	*No. of cars*	*Type of car*	*Builder*
Atchison, Topeka & Santa Fe	145[14]	Chair	Budd Co.
	8[14]	Dome-lounge	Budd Co.
	50[14]	Baggage	Budd Co.
	10[14]	Railway post office	Budd Co.
Chicago & Eastern Illinois	10[13]	Coaches	Budd Co.

[1] Delivery Scheduled for completion by December 31.

[2] Deliveries scheduled for summer of 1953.

[3] Deliveries scheduled to begin late in November and completed by February. When all units are received, the road will be completely dieselized. The switchers will have multiple-unit controls.

[4] Deliveries expected to be completed by July 1, 1953.

[5] Estimated cost $3,500,000.

[6] In addition to 25 reported in the October issue. Estimated cost of the 50 cars, $362,769.

[7] These single door-steel cars will cost over $6,200,000. Construction to begin before the end of 1952.

[8] Scheduled for delivery in the spring of 1953.

[9] Estimated cost of $9,549 each, subject to interim escalation. Delivery scheduled to begin in September 1953 to be completed in December 1953.

[10] Larger cars to cost $36,500; smaller car, $26,944.

[11] The 70-ton gondolas and the pulpwood flat cars are for service on the Texas & New Orleans.

[12] Delivery of the cars, which will cost approximately $300,000, is expected during the first quarter of 1953

[13] For delivery in the second quarter of 1953. Cost of gondola cars, $199,500; of ballast cars, $39,335

[14] The chair cars will seat 48-passengers, and the full-length dome-lounge cars 76 passengers each in the upper section. Delivery of the cars is expected to begin in the fall of 1953.

[15] Scheduled for delivery in fall of 1953.

Notes:

Atchison, Topeka & Santa Fe.—The Santa Fe has received approval from its board of directors to build 500 hopper cars, 500 gondola cars and 250 covered hopper cars in the road's own shops.

Northern Pacific—Orders for new passenger equipment—including 10 dome coaches, six dome sleeping cars, two dining cars, four sleeping cars and two coaches—will soon be placed by the Northern Pacific.

Unbeatable for high-voltage use

"U. S." USKORONA-NEOPRENE POWER CABLES offer to the exacting railway industry an unbeatable reliability on overhead and underground high-voltage power applications on circuits up to 8000 volts between phases and at conductor temperatures up to 75° C. They will not crack after 3 hours in air containing .015 per cent ozone. Light in weight, easy to install and join, resistant to oil, heat, sunlight, flame, acids, alkalies and corrosive chemicals. USKORONA-NEOPRENE cables also eliminate electrolysis. In the chart at the right are the guaranteed test values.

PRODUCTS OF U.S.RUBBER SERVING THROUGH SCIENCE

MOISTURE RESISTANCE (Maximum Values)

Dielectric Constant and Power Factor of the insulation after immersion in water at 50° C.: Dielectric Constant, one day is 4.5; per cent gain, 1 to 14 days is 5.0; per cent gain, 7 to 14 days is 2.0; Power Factor, per cent, one day is 3.0; Stability Factor 40-80 volts/mil two weeks, per cent is .5.

PHYSICAL AND AGING PROPERTIES (Minimum Values)

	Uskorona			Neoprene Jacket	
	Unaged	After 96 Hrs. O.B.	After 7 Day Geer Oven	Unaged	After 96 Hrs. O.B.
Tensile Lbs./Sq. In.	500	450	450	1800	1600
Elongation Per Cent	250	200	200	300	250

UNITED STATES RUBBER COMPANY

ELECTRICAL WIRE AND CABLE DEPARTMENT • 1230 AVENUE OF THE AMERICAS, NEW YORK 20, NEW YORK

Actual Operating Conditions, by R. B. Cottrell, American Steel Foundries.

2:30 P.M.

Railroad (V)—Gas-Turbine Power (VIII)—A.I.E.E.

Gas-Turbine Electric Locomotives on the Union Pacific, by A. H. Morey, General Electric Co., and F. Fahland, research and standards engineer, Union Pacific.

Operation of Westinghouse-Baldwin Gas-Turbine Locomotive, by T. L. Weybrew, C. Kerr, Jr., and T. J. Putz, Westinghouse Electric Corp.

Correction Notice

IN the illustration at the bottom of page 89 of the September Railway Mechanical & Electrical Engineer, the truck shown on the repair stand at the right is an EMD diesel freight unit truck and not an Alco truck as might be implied from the title of the article.

June 1953 Program of Mech. Div. Announced

THE 1953 annual meeting of the Mechanical Division, Association of American Railroads, will be held June 22-26, inclusive, at Atlantic City, N. J., where the Pan American Railway Congress will also be in session from June 21 to 25, its earlier sessions, June 12-19, being scheduled at Washington, D. C. The Purchases and Stores Division will also hold sessions on June 22-26, and there will be an A.A.R. member road meeting during the week. For the benefit of those attending all these meetings, there will be an exhibit under the auspices of the Railway Supply Manufacturers Association.

The meeting will open on Monday, June 22, at 9:30 a.m. Daylight Saving Time, with a joint session of the Mechanical and Purchases and Stores Divisions. No afternoon sessions are scheduled. C. W. F. Coffin, president of the Railway Supply Manufacturers Association, will call the meeting to order. Following addresses by Mayor Joseph Altman of Atlantic City and William T. Faricy, president, A.A.R., the Mechanical Division will convene in Meeting Room "B." H. T. Cover, assistant vice-president (operating) and chief of motive power, Pennsylvania Railroad, will preside. The Division will then proceed with the following program.

MONDAY, JUNE 22

Address by J. M. Symes, executive vice-president, Pennsylvania.

Address by J. H. Aydelott, vice-president, Operations and Maintenance Department, A.A.R.

Address by Chairman H. T. Cover.

Action on Minutes of 1952 meeting.

Appointment of Committees on Subjects, Resolutions, etc.

Unfinished business.

New business.

Report of General Committee.

Report of Nominating Committee.

TUESDAY, JUNE 23
9:00 A.M.

Address by W. J. Patterson, Member, Interstate Commerce Commission.

Discussion of reports on:

Arbitration.

Prices for Labor and Materials.

Loading Rules.

Forest Products Loading.

Tank Cars.

Geared Hand Brakes.

WEDNESDAY, JUNE 24
9:00 A.M.

Address by William White, president, New York Central System.

Discussion of reports on:

Car Construction.

Passenger Car Specifications.

Brakes and Brake Equipment.

Couplers and Draft Gears.

THURSDAY, JUNE 25
9:00 A.M.

Address by V. N. Dawson, general store keeper, Baltimore & Ohio.

Distribution and collection of ballots for members of General and Nominating Committees.

Discussion of reports on:

Specifications for materials.

Safety Appliances.

Wheels.

Lubrication of Cars and Locomotives.

FRIDAY, JUNE 26
9:00 A.M.

Discussion of reports on:

Axle and Crank-Pin Research.

Locomotive Construction:

Steam and Electric Section.

Diesel Section.

Gas-Turbine-Locomotive Section.

Report of Tellers.

Report of Committee on Resolutions.

SATURDAY, JUNE 27

Inspection of exhibits.

AB Brake Deadlines Set For Non-Interchange Cars

NON-INTERCHANGE cars (including cabooses) that may be used in transporting revenue freight must all be equipped with AB brakes by December 31, 1953, and all other non-interchange cars must be equipped by December 31, 1954.

These deadlines were set by the Interstate Commerce Commission in a September 24 order by Commissioner Patterson. The order, issued in the No. 13528 proceeding, was based on the record of a public hearing held September 15 at Chicago.

On September 25, one day after the above order was entered, Division 3 of the commission entered another in the case. It modified the proceeding's basic order by adding a stipulation which said installation of AB brakes would not be required "on cars that are used exclusively in switching operations and are not used in train movements within the meaning of the Safety Appliance Acts."

Dr. Buchi Receives Henderson Medal

DR. Alford J. Buchi of Winterthur, Switzerland, received the George R. Henderson Medal of the Franklin Institute at the Institute's Medal Day ceremonies on October 15. The citation accompanying the medal reads as follows: "In view of his contributions in augmenting the capacity and performance of the four-cycle diesel engine through his turbocharging system, in all classes of service, but particularly in the railway field."

The system developed by Dr. Buchi was primarily designed for the four-cycle engine. In the invention is the introduction of the multiple exhaust pipe arrangement, a feature which contributed materially to the success of supercharging the diesel engine. The system has had extended application in the stationary, marine and locomotive fields. In the latter field alone in this country the application of Buchi-turbocharged engines amounts to practically 8.5 million horsepower, or about 7,000 diesel locomotives

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (total)	Cars set off between division terminals account hot boxes			Miles per hot box car set off between division terminals
		System	Foreign	Total	
July, 1950	2,745,932,894	....	....	23,957	114,619
August, 1950	2,937,455,020	7,422	15,490	22,912	128,206
September, 1950	2,974,297,739	6,541	12,881	19,422	153,141
October, 1950	3,165,997,915	4,343	8,935	13,278	238,439
November, 1950	2,868,871,913	2,536	5,331	7,867	364,672
December, 1950	2,813,042,212	2,278	5,968	8,246	341,140
January, 1951	2,840,847,511	2,870	8,436	11,306	251,269
February, 1951	2,425,226,454	4,528	14,063	18,591	130,452
March, 1951	3,063,173,942	3,667	10,078	13,745	222,857
April, 1951	2,996,562,763	3,702	8,914	12,616	237,521
May, 1951	3,013,634,782	5,631	13,737	19,368	155,599
June, 1951	2,874,873,495	7,074	15,376	22,450	128,057
July, 1951	2,768,920,095	8,886	18,823	27,709	99,929
August, 1951	3,009,371,111	9,023	19,092	28,115	107,038
September, 1951	2,925,570,545	6,472	13,565	20,037	146,008
October, 1951	3,116,490,095	4,131	9,053	13,184	236,384
November, 1951	2,939,503,144	2,022	4,405	6,427	457,368
December, 1951	2,752,316,133	2,130	5,398	7,528	365,611
January, 1952	2,824,298,630	3,208	7,197	10,405	271,437
February, 1952	2,809,162,671	2,723	6,473	9,196	305,477
March, 1952	2,943,812,727	2,594	5,877	8,471	347,517
April, 1952	2,766,313,714	3,826	7,759	11,585	238,784
May, 1952	2,918,508,445	6,020	10,938	16,958	172,102
June, 1952	2,672,512,889	8,466	14,495	22,961	116,394

Now YOU can get it!

NEW NATIONAL GRADE DE-3 BRUSH
TRADE-MARK

FOR EMD TRACTION MOTORS

An Entirely New Scientific Development for This Specific Service

DOLLARS AND SENSE... point to "Eveready" No. 1050 Industrial Flashlight Batteries ...delivering twice as much usable light as any battery we've ever made before. Their unique construction prevents swelling or jamming in the case ... has no metal can to leak or corrode.

After several years of continuous research and development and 2½ years of field tests under all kinds of operating conditions, National Carbon's remarkable NEW grade DE-3 brush is now available for Electro-Motive Traction Motors.

Grade DE-3 is a true product of scientific research — a result of National Carbon's unique, intensive program devoted specifically to developing better brush grades for Diesel Electric Locomotive service.

Tested *in service* by seven class 1 roads for over 7½ million motor miles, this new brush has *proved* its claims of

- **LONGER SERVICE LIFE,**
- **GREATER DEPENDABILITY,**
- **LOWER COST PER MILE**

... than any other brush ever offered for this service!

START SAVING MONEY NOW!
SPECIFY "NATIONAL" GRADE
DE-3 BRUSHES

The terms "National", "Eveready", the Three Pyramids device and the Silver Colored Cable Marking are registered trade-marks of Union Carbide and Carbon Corporation

NATIONAL CARBON COMPANY
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y.
District Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco
In Canada: National Carbon Limited, Montreal, Toronto, Winnipeg

of all kinds (passenger, freight and switching locomotives).

From 1909 to 1918 Dr. Buchi was chief of the research department for diesel engines in the Sulzer Brothers' plant at Winterthur. From 1918 to 1919 he was chief engineer in charge of marine diesel engines at Howaldtswerke in Kiel, Germany, and from 1919 to 1927 was chief engineer in the diesel engine department of Sulzer Brothers. In the latter year he began the organization of the Buchi Syndicate for the development of the turbocharging system. From 1928 to 1935 he was managing director of the Swiss Locomotive and Machine Works at Winterthur, and since then has acted as head of the Buchi System.

In 1937 Dr. Buchi received the Melville Award of the American Society of Mechanical Engineers for his paper on Supercharging of Internal-Combustion Engines with Blowers Driven by Exhaust Gas Engines.

Chicago Car Foremen Elect New Officers

At its annual meeting, October 10, in Chicago, the Car Foremen's Association of Chicago elected the following officers for the ensuing year: President, J. F. Monger, shop superintendent, Illinois Central; first vice-president, H. A. Harris, master car builder, Gulf, Mobile & Ohio; second vice-president, H. L. Hewing, superintendent, Chicago Car Interchange Bureau; secretary-treasurer, W. R. McCain, mechanical assistant, Mather Stock Car Company.

Wilkinson

High Speed Diesel Lube Oil Transfer Pump

REDUCE your Diesel lube oil handling time by more than 41% and eliminate oil spillage. Use the WILKINSON lightweight air-operated transfer pump. Only weighs 15 lbs. and *no air enters drum or oil.*

You can pump a 55-gal. barrel S.A.E. #40 lube oil in 5 minutes with only one man.

Can furnish ready-to-use,—package consisting of WILKINSON Transfer Pump, 35 feet of ¾" oil hose, and automatic shut-off valve.

HUDSON 3-5221

WILKINSON EQUIPMENT & SUPPLY CORP.

6958 South Wentworth Avenue, Chicago 21, Illinois

SUPPLY TRADE NOTES

Van der Horst Corporation.—*William J. Fritton*, formerly assistant to president, has been elected vice-president and sales manager of the Van der Horst Corporation, with headquarters at Olean, N. Y.

◆

Cummins Engine Company.—*C. R. Boll, Jr.*, has been appointed general sales manager at Columbus, Ind. Mr. Boll, who was previously manager—engine sales, will be responsible for engine, parts and contract sales, the company's regional organization, advertising and sales development. *C. B. Foster* has been appointed to the newly created position of sales manager—engines at Columbus. Mr. Foster will continue in charge of all government contract work and, in addition, will take over the duties of the former position of manager—engine sales.

◆

Dearborn Chemical Company.—*Theodore B. Manheim*, formerly with Scholler Brothers, Inc., Philadelphia, has joined the sales staff of the Dearborn Chemical Company, Chicago. Mr. Manheim will cover the Philadelphia and Delaware territory, with headquarters in Philadelphia.

◆

Pressed Steel Car Company.—The Pressed Steel Car Company is making arrangements to acquire the *Axelson Manufacturing Company* of Los Angeles, maker of petroleum-pumping and aircraft equipment, and the *Umpqua Plywood Corporation* of Eugene, Ore., a plywood and lumber company.

◆

Koppers Company.—*Emmett F. Cary*, formerly district sales manager of the coupling department of Koppers Company, has been appointed district sales manager products division, with headquarters in Pittsburgh. His territory will include western Pennsylvania, West Virginia and part of Ohio.

◆

KSM Products, Inc.—KSM Products, Inc., manufacturer of welding studs and stud welding equipment, has moved to a new, larger plant near Merchantville, N. J.

◆

Reliance Electric & Engineering Co.—*William F. Kiser, Jr.*, and *Robert T. Jennings* have been appointed sales application engineers for the Reliance Electric & Engineering Co., in the Philadelphia and Detroit district sales offices, respectively. *John M.*

WHEN CRACKED DIESEL CYLINDER HEADS COME IN FOR REPAIRS

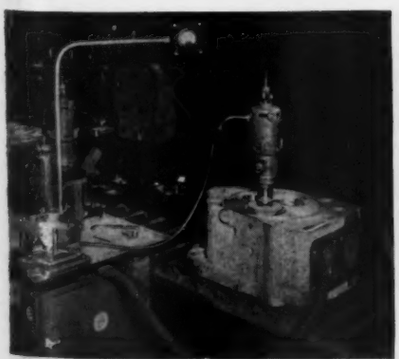
Ordinary processes can't do the job!

Here's why: *It takes special equipment, materials and experience to rebuild them like new.* Otherwise they'll be back in the shop in no time. Below you see some of the processes developed by the STARK organization over the past twenty years—processes which have rebuilt more than half a million Diesel heads throughout the country . . . a record unmatched in the industry.

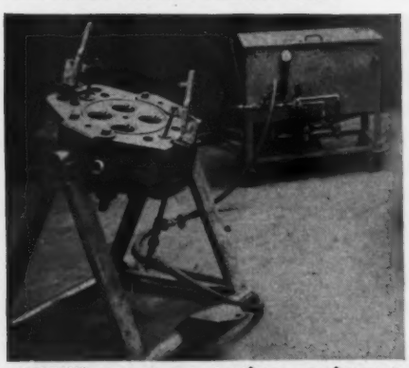
STARK'S specially designed ovens. These preheating and annealing ovens eliminate internal stresses and strains, and assure perfect fusion

STARK'S exclusive Chrome Nickel Alloy. This alloy for building up valve seats produces cylinder heads having higher tensile strength and Brinnell hardness than new ones.

STARK'S precision machining process. Special carbide-tipped cutters are used to machine built-up valve seats. One of the many precision operations in the STARK process.



STARK'S special grinding equipment. Use of precision equipment assures accuracy to closest tolerances for perfect valve seating. Original specifications restored.



STARK'S pressure testing equipment. All cylinder heads are tested three times, at 100 lbs. hydrostatic pressure. No chance for flaws or cracks to be overlooked.

STARK guarantees equal-to-new efficiency
Send us a trial order of your cracked Diesel heads for rebuilding. If you are not satisfied, there will be no charge. Or write for further details and information about the STARK rebuilding process, and how it can mean large savings in your maintenance costs.

RALPH STARK
INCORPORATED
43-12 THIRTY-THIRD STREET
LONG ISLAND CITY, N.Y.

Duff has been assigned to the applied engineering and industrial sales department, at Cleveland.

◆

ELECTRIC STORAGE BATTERY COMPANY.—*A. G. Sheppard*, an employee of the New York Central at Cleveland, has received the $50 U. S. Savings Bond set aside by the Electric Storage Battery Company at its exhibit at the recent meeting of the A.A.R. Electrical Section at Chicago for the person guessing most closely the number of times the Exide battery on display would propel itself around the track before becoming discharged. The actual number of times was 7,888; Mr. Sheppard's guess, 7,890.

GENERAL ELECTRIC COMPANY.—The General Electric Company has begun construction of a $1,600,000 service shop at Erie Avenue and I street, Philadelphia. The new one-floor structure will encompass 130,000 sq. ft. of floor space, and is scheduled to go into operation in May 1953. It will be G. E.'s largest and best equipped service facility, capable of handling transportation, utility and industrial apparatus. The area it will service includes southern New Jersey, eastern Pennsylvania and Delaware.

◆

JOSEPH T. RYERSON & SON.—*William O. Springer* has been appointed manager of the Ryerson New York plant. Mr. Springer formerly managed the firm's Cleveland plant. *James M. Mead*, whom Mr. Springer replaces at New York, is moving to the executive offices at Chicago for special administrative duties. *John W. Queen*, formerly alloy steel division manager at Chicago, has succeeded Mr. Springer at Cleveland.

◆

BOWSER INC.—*Frankline Fickett*, formerly sales representative of locomotive replacement parts for the Hunt-Spiller Manufacturing Company of Boston, has been appointed manager of the railroad sales division of Bowser, Inc.

Mr. Fickett gained his early railroad experience as an apprentice machinist in the mechanical department of the New York, New Haven & Hartford. From September 1942 until August 1946 he served with a United States railroad battalion, spending two years in Iran on maintenance of diesel locomotives. Upon separation from service as a first lieutenant, he joined the railroad division of Fairbanks, Morse & Co. as a service engineer, diesel locomotives.

Franklin Fickett

◆

TRUSCON STEEL COMPANY.—*C. B. McGehee* has been made vice-president of the Truscon Steel Company, a subsidiary of the Republic Steel Corporation, Mr. McGehee previously was general manager of sales of Truscon.

◆

ALUMINUM COMPANY OF AMERICA.—The Aluminum Company of America will construct a large aluminum-smelting project in Alaska as soon as the necessary land can be purchased and required governmental approvals obtained. The project will be in the Taiya Valley district, near Skagway, and will cost approximately $400,000,000. The facilities initially would be capable of producing some 200,000 tons of aluminum annually. From the time of starting, it is thought it will take four years to complete the project and start aluminum production there.

◆

SCHAIFE COMPANY.—*Sheller L. Steinwender* has been appointed to the new position of vice-president—sales of the Schaife Company. His responsibilities will include supervision of all sales activity of pressure vessels for gases, air and liquids—range boilers, liquefied petroleum gas cylinders, diesel

FELPAX Lubricators help keep the "Empire Builder" on schedule

From the first turn of the wheels in Chicago, through the rugged Rockies to Seattle and back again, the suspension bearings on G.N's. "Empire Builder" get full, continuous lubrication with modern FELPAX LUBRICATORS! Special felt wicks, that last thousands of miles, eliminate waste grabs and starved bearings caused by old fashioned yarn packing.

You can solve *your* suspension bearing lubrication problems, too, with FELPAX LUBRICATORS.

For full information on Modern FELPAX Lubricators see your locomotive builder or write to:

the lubricator that eliminates repacking

MILLER FELPAX LUBRICATOR

MILLER FELPAX CORPORATION
WINONA MINNESOTA

to cut maintenance time Jersey Central specifies* Elastic Stop nuts

(list of freight applications)

Retaining Valve to Bracket

Cenco Pipe Clamps

Running Boards and Brake Steps

Brake Cylinder to Support

AB Valve to Support

Roof Handhold and Lateral Running Board

Brake Regulator to Support

AB Reservoir to Support

MAIL COUPON

for further information on ESNA® self-locking fasteners for locomotives, passenger and freight cars.

Central Railroad of New Jersey has effected important savings in freight car maintenance. By specifying Elastic Stop Nuts on new equipment, they have eliminated much of the costly, time-consuming inspection and retightening required by ordinary nuts.

The red locking collar on each Elastic Stop Nut damps out vibration . . . holds firm under the most severe operating stresses. Inspection requirements are minimized. Elastic Stop Nuts are reusable—there is no need to burn off and replace nut and bolt. Like many other leading roads, Jersey Central has realized the long range maintenance economy that only Elastic Stop Nuts provide.

Elastic Stop Nut Corporation of America is also maker of the ROLLPIN

ROLLPIN TRADEMARK

Dept. N27-1123, Elastic Stop Nut Corporation of America, Railways Sales Div.
2330 Vauxhall Road, Union, N. J.

Please send me the following free information:

☐ Elastic Stop Nut Bulletin
☐ Rollpin Bulletin
☐ Here are details on our fastening problem. What fastener do you suggest?

Name_____ Title_____

Firm_____

Street_____

City_____ Zone____ State_____

. . . making available at a moments notice, the dependable power needed to keep your windshields clear in the unpredictable weather ahead.

AIR-PUSH REPLACEMENT KITS

are now available for *all makes* of diesel locomotives . . . will operate for extra long periods of time without continuous maintenance.

Sprague

DEVICES, INC.

Michigan City, Indiana

MANUFACTURERS OF THE FAMOUS AIR-PUSH WINDSHIELD WIPERS

starter tanks, armament and others. Mr. Steinwender formerly was general sales manager of the Eastern district for the A. O. Smith Corporation.

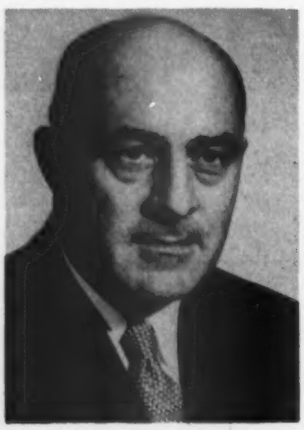
◆

BONNEY FORGE & TOOL WORKS.—*Fred S. Durham, Jr.*, vice-president and secretary of the Bonney Forge & Tool Works, Allentown, Pa., who for the past several years has supervised the company's sales efforts, has assumed additional responsibilities as director of sales. *Harry J. Seaman* has been appointed field supervisor and *E. S. Sensenderfer*, manager of merchandising.

◆

NEW YORK AIR BRAKE COMPANY.—*Charles T. Zaoral* has been elected a director and, vice-president in charge of operations; *Lewis K. Sillcox*, has been elected vice-chairman of the board, and *Robert G. Hess*, has been appointed manager of the company's main division at Watertown, N.Y.

Mr. Zaoral has been general manager of the international division of Bendix Aviation Corporation and a director of its subsidiaries in Canada and Australia for the past seven years. Before joining Bendix, he was with General Motors Corporation for



Charles T. Zaoral

15 years, principally in sales and engineering activities. During World War II he worked for the Electro-Motive Division at La Grange, Ill., where he was in charge of market and sales research on diesel locomotives for United States and foreign railroads. In 1945 he was appointed chief executive officer of Bendix International.

Mr. Sillcox began his career in 1903 as a railroad foundry apprentice. From 1918

Lewis K. Sillcox

to 1927 he was general superintendent of motive power of the then Chicago, Milwaukee & St. Paul. In the latter year he became first vice-president of New York Air Brake, and in 1948 he was elected a director and in 1949, executive vice-president.

Robert G. Hess

Mr. Hess began his career with the Westinghouse Electric Corporation. In 1941 he was appointed general superintendent of Hydraulic Controls, Inc., of Chicago, which subsequently became the hydraulic division

APEX INSERTED-BLADE METAL-CUTTING **TOOLS**

FOR LOCOMOTIVE AND CAR MAINTENANCE

Adjusted Serrated Style

for axle jobs. One of many types of railroad shop cutting tools available promptly from stock.

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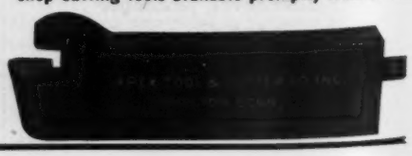


APEX TOOL & CUTTER CO., Shelton 21, Conn.

of New York Air Brake. Mr. Hess worked in various capacities until he was named head of the company's subsidiary, the Kinney Manufacturing Company, which position he held at the time of his new appointment.

◆

PULLMAN-STANDARD CAR MANUFACTURING COMPANY.—A large group of railway officers, railway supply representatives and members of the press were given a personally conducted tour through research and developments facilities of the Pullman-Standard Car Manufacturing Company at Hammond, Ind., on September 12. Led by Director O. C. Maier and members of his staff, the group saw how pre-testing improves basic car design, and glimpsed some of the company's long-range development projects.

Impact tests—in which a box car, carrying a predetermined load, was struck by a fully-loaded hopper car at speeds up to 18 m.p.h., by means of an inclined track—received considerable attention. Forces of the impact and the stresses they set up, acceleration, and other pertinent data were recorded by a dynamometer coupler, strain gages, accelerometers, oscillographs and other modern test equipment as the group watched.

The research model "Train X" coach (page 110, July issue), built for the Chesapeake & Ohio, and recently given extensive road tests was another exhibit that received wide attention. Director Maier and his staff also demonstrated high-speed, submerged-arc welding, a development expected to speed production while improving the quality of welding by reducing shrinkage and residual stresses. Other demonstration exhibits included the testing of freight car floors; static load testing of a passenger car side frame; fatigue tests of a covered hopper car; use of an analog computer to solve problems of car impact; and use of high-speed ("slow motion") motion picture cameras to study action of car parts under dynamic test conditions.

◆

GRIFFIN WHEEL COMPANY.—The Griffin Wheel Company, a wholly owned subsidiary of American Steel Foundries, has announced expansion of its pilot plant at Chicago for producing Association of American Railroads X-3 type steel freight-car wheels. The company also plans construction of a car-wheel foundry at St. Hyacinthe, Que., to be known as Griffin Steel Foundries, Ltd., which will likewise produce the new X-3 wheels.

When the pilot plant at Chicago is enlarged, it will have a capacity of about 360 wheels a day. X-3 wheels, which have been approved for freight interchange service in limited quantities, are made of about 0.75 per cent carbon steel melted in an electric furnace and forced into permanent molds. Upon removal from the molds, the wheels are placed in heat-treating furnaces and subsequently cooled so as to remove internal stresses. Temperature and timing of each production step is automatic.

The new Canadian plant, which will be housed in a brick building of modern design, will ultimately have a capacity of 360 X-3 wheels a day, but initial produc-

Wherever there's Grease and Oil...

USE THE SPRAY SOAK RINSE METHOD!

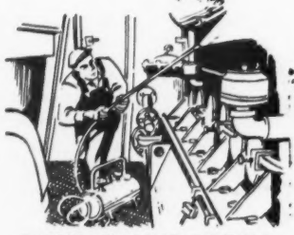
One man, with a spraying unit and a low-cost cleaning solution, will get rid of any oily, greasy dirt—anywhere—in a fraction of the time you now take with ordinary cleaning methods.

SPRAY ON...SOAK IN...RINSE OFF

You spray on a solution made up of one part Diesel Magnusol—a concentrated cleaner—mixed with six to eight parts of safety solvent. Let it soak in for a few minutes. Then rinse off with water. That's all there is to this cleaning job when you use Diesel Magnusol.

NO HEAT REQUIRED

You don't have to heat the Magnusol solution . . . nor the rinse water. You get cleaner, grease-free surfaces impossible to attain by any other method.



DIESEL ENGINE ROOMS

ENGINE PITS

TRUCKS

CONCRETE FLOORS

WHAT DIESEL MAGNUSOL PROVIDES:

A SAFE CLEANER — Non-toxic, non-flammable, fumeless, safe for the skin, harmless to all metals.

AN ECONOMICAL CLEANER—Cutting labor costs to the minimum, eliminating heating. Low-cost solution to work with.

A SCIENTIFIC CLEANER — that takes the cling out of grease and oil, loosens the bond between the dirt and the surface to be cleaned, and forms an emulsion with rinse water in which all the dirt is carried away.

TRY IT! *Order a small drum of Diesel Magnusol. Use it 30 days according to our recommendations. If you are not completely satisfied at that time, send the unused material back and we will cancel the full invoice.*

Railroad Division

MAGNUS CHEMICAL COMPANY • 77 South Ave., Garwood, N. J.

In Canada—Magnus Chemicals, Ltd., Montreal

Magnus CLEANERS AND CLEANING EQUIPMENT

Representatives in all principal cities

tion—which is expected to begin in the summer of 1953—will be about half that figure. At present, Canadian roads must import all steel freight car wheels from the U.S. or other countries.

The X-3 steel wheel is being introduced on the 75th anniversary of Griffin's entry into the freight-car wheel manufacturing field.

◆

UNITED STATES STEEL COMPANY.—*Herbert J. Watt* has been appointed assistant vice-president—sales, Western area, and *F. Royal Gammon*, assistant vice-president—sales, Eastern area, of the United States Steel Company.

Mr. Watt, whose headquarters will be in Chicago, was originally employed by the Carnegie Steel Company in 1912. In 1925 he joined the sales department of the Jones & Laughlin Steel Corp. as assistant general manager of sales at New York. He returned to the Carnegie-Illinois Steel Corporation in 1939 and in 1941 was transferred to Chicago as manager of sales for the western area.

Mr. Gammon joined the sales department of Carnegie-Illinois in 1936 as special representative in the New York district sales office. In 1938 he was appointed manager of district sales at Cleveland; in 1942 manager of district sales at New York; and in 1950 manager of sales for the Eastern area. Mr. Gammon's headquarters will continue at New York.

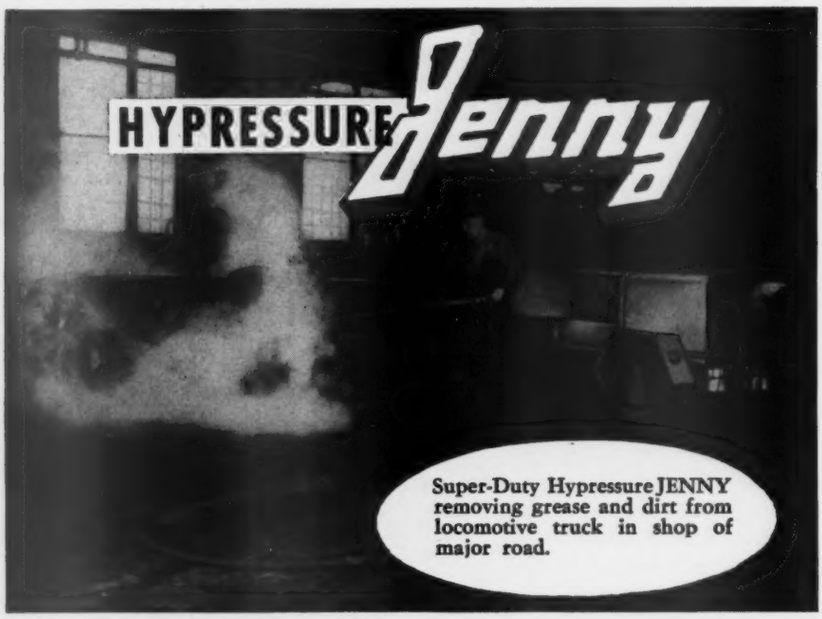
◆

GENERAL MOTORS CORPORATION.—*Danie J. Smilanich*, chief engineer of General Motors Diesel, Ltd., has rejoined the *Electro-Motive Division* at La Grange, Ill. Mr. Smilanich will establish a group to develop designs for locomotive conversions, and repair information for wrecked locomotives.

D. J. Smilanich

W. A. Stringer

A. O. Myers



Super-Duty Hypressure JENNY removing grease and dirt from locomotive truck in shop of major road.

Mechanized CLEANING SPEEDS SHOP ROUTINES

Hypressure JENNY Steam Cleaner gives shop schedules a big lift. By cleaning running gear parts and sub-assemblies, up to 60% production time is saved. Your skilled shopmen can get down to the job at hand without wasteful "make-ready." And Hypressure JENNY does the job in one-tenth the time that hand methods require. Other jobs include car cleaning, cleaning station and shop floors, walls, windows, etc.

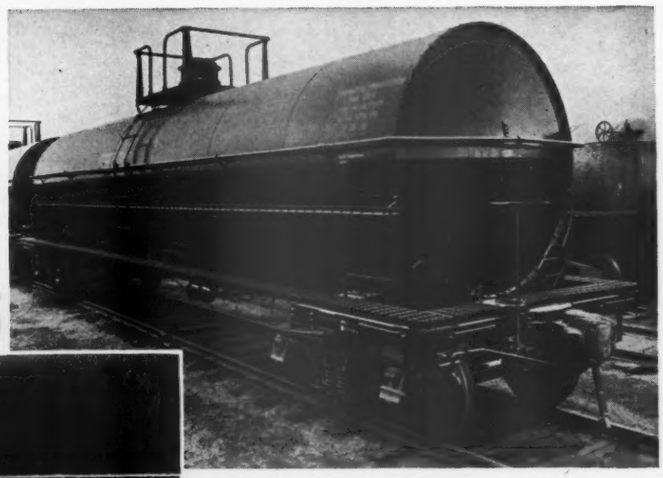
JENNY, the original and only fully patented steam cleaner, is manufactured by Homestead Valve Mfg. Co. Portable, self-contained, it rolls to the job; and from a cold start, is ready for use in less than 90 seconds. Models and capacities for every railroad need.

Write for complete information.

Exclusive Distributors To The Railroads

148 ADAMS AVE., SCRANTON 3, PA.

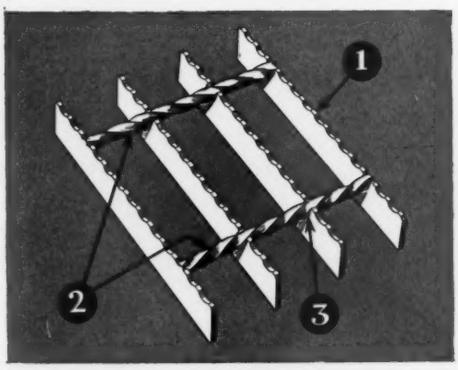
They Walk in SAFETY *with* KERRIGAN *Weldforged* TRADE MARK TANK CAR RUNNING BOARDS



All the Way Around!

Non-Skid, Foot-Sure Safety—safety that is "built-in" Kerrigan grating by the exclusive *Weldforged* process. *Spiraled* all-steel cross-bars (alternating right and left) are fused with sharp-edged serrated bearing bars to form an inseparable *one-piece* grating. By this method weld failure becomes impossible; and yet, even at the point of union, the non-slip spirals of the cross-bars are uninterrupted.

SAMPLES LIKE THIS SHOW IN DETAIL HOW WELDFORGING ACHIEVES UNINTERRUPTED SAFETY:



1. Bearing bars are serrated with clean, sharp edges for the non-slip foundation.
2. Transverse bars, with CONTINUOUS spirals are WELDFORGED into bearing bars with the spirals alternating right and left.
3. Grating is ONE-PIECE unit with uninterrupted spirals even at point of fusion with bearing bars.

KERRIGAN *All Steel* TANK CAR or BOX CAR RUNNING BOARDS and BRAKE STEPS are ALL fabricated to YOUR specifications!

KERRIGAN is the name!

***Weldforged* is the process!**

★ Approved by the Association of American Railroads.

★ Strong ★ Safe ★ Weather-proof

★ Long-lasting ★ Easily installed

Write Now for detailed application drawings and illustrated catalog. Or contact our Engineering Service for complete details for your particular application.

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MANUFACTURED BY

THE FORGES OF KERRIGAN

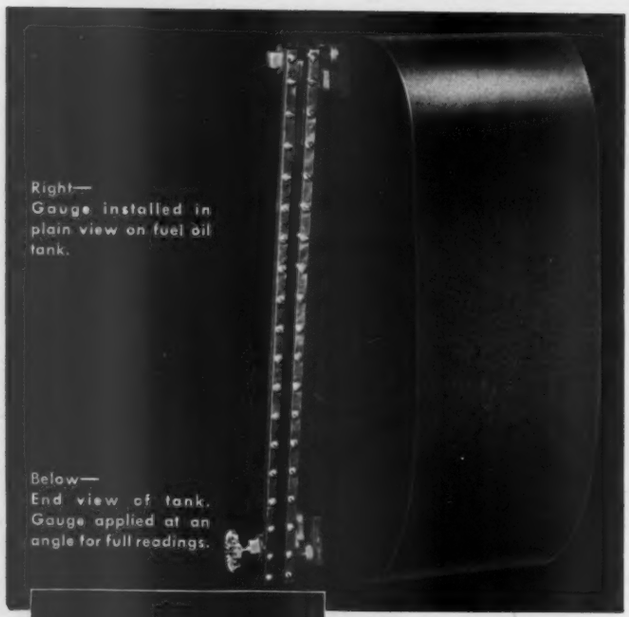
KERRIGAN IRON WORKS, INC.

NEW YORK • CHICAGO • NASHVILLE

Get Full Readings on Diesel Fuel Tanks

with this New

MAGNUS GAUGE



Right—
Gauge installed in plain view on fuel oil tank.

Below—
End view of tank. Gauge applied at an angle for full readings.

A top-to-bottom gauge, flexible — mountable at any angle, the new Magnus diesel fuel tank gauge gives accurate full readings at all times. With a rigid brass body, the Magnus gauge is substantially built to stay on the job longer . . . not to be disturbed by vibration.

It's easily installed—simply by welding top and bottom plates to tank and drilling two holes. The reflex glass gives you accurate readings at a glance. For quick clean-out, just unscrew top and bottom plugs. Automatic shut-off valve prevents fuel loss in case of breakage.

Write for further information.

MAGNUS BRASS MFG. CO.
Subsidiary of National Lead Co.
525 Reading Road Cincinnati 2, Ohio

For Safety's Sake!

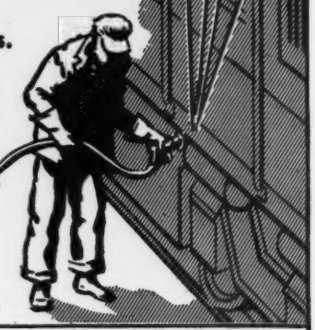
VENTALARM®
WHISTLING TANK FILL SIGNAL

Eliminates Overflow Spillage During Diesel Locomotive Fueling

"JUST FILL 'TIL THE WHISTLE STOPS"

No floats. No wiring.
No electrical connections.

Send for free illustrated folder on VENTALARM Signal installation and operation on Diesel Locomotives



SCULLY SIGNAL COMPANY
69 First Street
Cambridge 41, Mass.

Over 4,000,000 VENTALARM Signals now in operation on home fuel oil tanks and automotive gasoline tanks.

Sweeney PORTABLE

MODEL 1100

TACHOMETER TESTER

ACCURATELY TESTS ALL MAKES OF PORTABLE TACHOMETERS IN JUST A FEW SECONDS

TESTS at SEVEN SPEEDS 300, 500, 600, 720, 800, 1000, 1800 R.P.M.

JUST PLUG IT IN ON AC!
ACCURATE AS an ELECTRIC CLOCK!

Precision-built by the makers of the famous Sweeney POWERENCH Tools

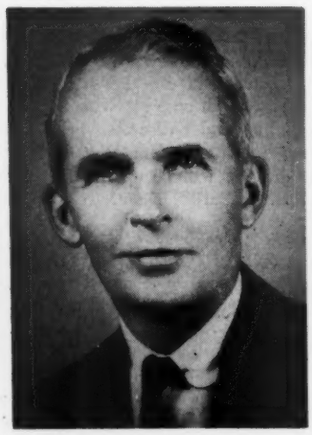
B. K. SWEENEY MFG. CO., Denver 17, Colo. 11 R5
Please send full information on your Portable Tachometer Tester

Name_____

Address_____

City_____ State_____

W. A. Stringer, has been appointed sales representative, Southeastern region of the Electro-Motive Division at Jacksonville, Fla. Mr. Stringer joined Electro-Motive in 1945 and was sales engineer at the time of his recent appointment. *A. O. Myers* and *B. K. Wingerter*, have been appointed, respectively, regional manager and district



B. K. Wingerter

sales manager of the Southeastern region at Jacksonville. Mr. Myers formerly was district sales manager at Washington, D.C.; Mr. Wingerter, sales representative in the Southeastern region.

W. P. Davis

William P. Davis, has been appointed to the newly created position of branch manager of the Robertson, Mo., factory branch of the Electro-Motive. Mr. Davis has been succeeded, in his former capacity of branch plant superintendent, by *John C. Sikes*.

◆

JOSEPH DIXON CRUCIBLE COMPANY.—*R. R. Huntington* has been appointed sales engineer in Louisiana, Mississippi and eastern Texas.

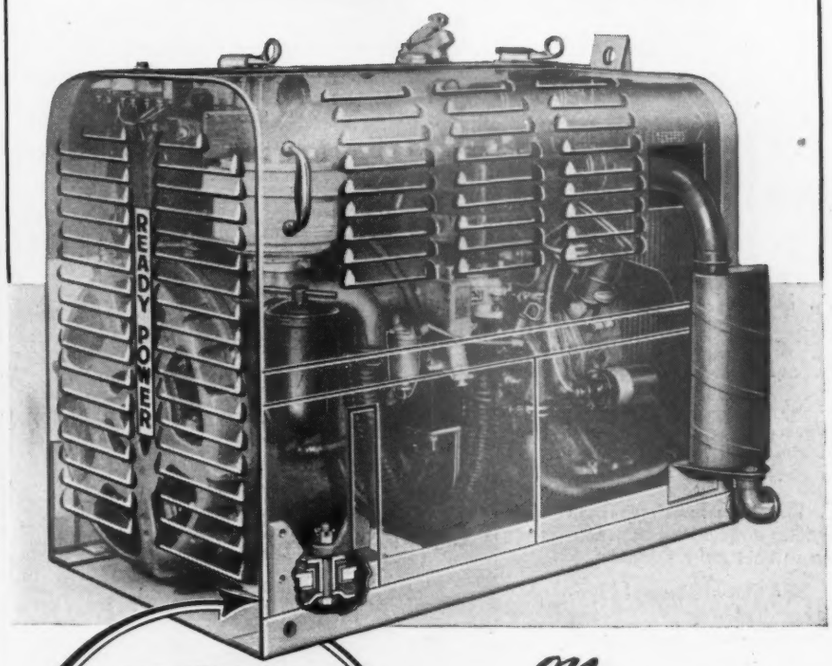
◆

HYSTER COMPANY.—The industrial truck sales and service departments of the eastern division of the Hyster Company have been transferred from Peoria, Ill., to Danville. The new sales offices are housed in a recently completed $40,000 office building, adjacent to the manufacturing plant.

◆

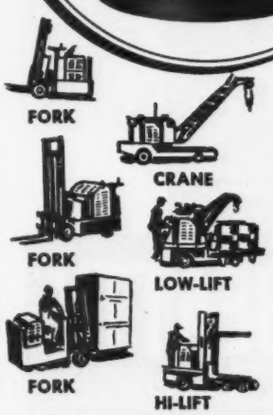
MCDOUGALL-BUTLER COMPANY.—Three new representatives have been added to the sales force of this company: *Alex R. Schrei-*

LORD MOUNTINGS
SERVE DUAL PURPOSE



on
THE READY-POWER CO.
"Live Power Units"

LORD Shock Mountings accomplish two vital objectives in the delivery of "Live Power" generated as needed directly on the truck chassis of industrial fork trucks, tractors, cranes and locomotives by Ready Power Units.



1. The upper Lord Mounting J-4497-2 absorbs the unusually high "g" shock loads encountered in industrial lift truck service . . . At the same time it is rigid enough to prevent excessive engine motion due to these destructive shock loads.

2. The lower member J-4591-1 is a rebound snubbing washer thicker than the sandwich section of the upper member J-4497-2. Precompression thus allows variable bracket thickness of plus or minus 1/16 inch. Thus the Lord Mountings serve the dual purpose of minimizing the vibration and the multiple shocks to which Ready-Power units are subjected in powering the heavy tools of industry. You can profit by Lord experience in the control of vibration and shock. Write or call . . .

BURBANK, CALIFORNIA — 233 South Third Street
DALLAS, TEXAS — 1613 Tower Petroleum Building
PHILADELPHIA 7, PENNSYLVANIA — 725 Widener Building
DAYTON 2, OHIO — 238 Lafayette Street
DETROIT 2, MICHIGAN — 7310 Woodward Ave.
NEW YORK 16, NEW YORK — 280 Madison Avenue
CHICAGO 11, ILLINOIS — 520 N. Michigan Ave.
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LORD MANUFACTURING COMPANY • ERIE, PA

LORD BONDED RUBBER
Headquarters for
VIBRATION CONTROL

20th National Exposition of Power and Mechanical Engineering
Grand Central Palace, N.Y., Booth No. 558, December 1-6, 1952

MAGICIANS

We don't pull rabbits out of hats. Our specialty is designing and building machines that work like "magic" in solving many heavy metal working production problems. The machines shown are typical examples. One of them may be just the answer for your personal production problem. If not, our broad experience in varied fields of the metal working industry enables us to design and build the ideal machine to meet your specific demands.

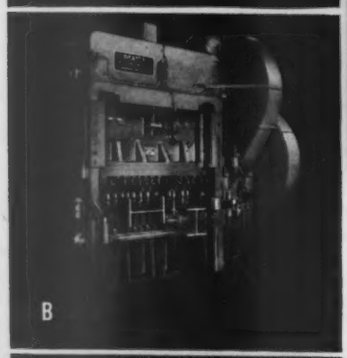
A. BEATTY Guillotine Bar Shear for "short order" shearing of bars, angles, rounds and squares.

B. BEATTY Guillotine Beam Punch. Punches webs and flanges in "I" beams from 6 to 30 inches.

C. BEATTY Spacing Table handles web and flange punching without roll adjustment.

D. BEATTY Horizontal Hydraulic Bulldozer for heavy forming, flanging and bending.

A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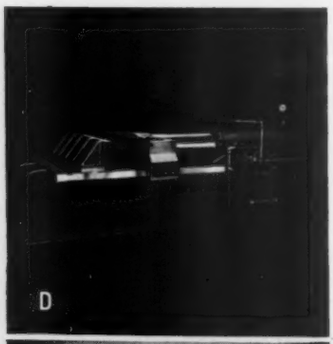
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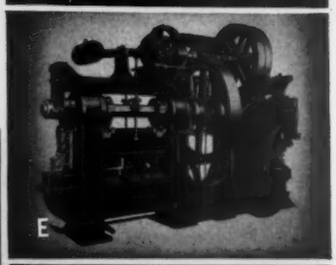

E

F

BEATTY
MACHINE & MFG. CO.
HAMMOND • INDIANA

E. BEATTY CoPunShear, one unit that does coping, punching and shearing without changing tools.

F. BEATTY Gap Type Press for forming, bending, flanging and pressing. Capacity 250 tons.

ber has been appointed to cover northeastern and north central New York, with headquarters at Syracuse; *George D. Reno*, to cover Connecticut and Rhode Island, with headquarters at West Hartford, Conn., and *William E. Dennis* in Cleveland and Cincinnati, with headquarters in Cleveland. *Justin A. Shook* was added to the Washington, D.C., staff several months ago.

◆

WATSON-STILLMAN FITTINGS DIVISION.—*Watson-Stillman Company*, Roselle, N. J., has been acquired by the H. K. Porter Company. Operations at Watson-Stillman will continue under direction of *Edwin A. Stillman*, president, The Watson-Stillman fittings division will be operated as a division of H. K. Porter.

◆

HEWITT-ROBINS, INC.—Hewitt-Robins, Inc., has opened new headquarters for the western division at 2533 Malt avenue, Los Angeles, and for the south central division at 5711 Navigation boulevard, Houston, Tex.

◆

INLAND STEEL COMPANY.—*John H. Strome*, formerly assistant to president of the Inland Steel Container Company, a subsidiary of the Inland Steel Company, has been appointed sales manager. *Thomas T. Crowley* has been appointed assistant to president to succeed Mr. Strome.

◆

QUAKER RUBBER CORPORATION.—*M. B. Beline* has been appointed director of national accounts of the Quaker Rubber Corporation, division of the H. K. Porter Company. Mr. Beline, who has been with the Porter Company for several years in the Washington, D. C., office, will coordinate the activities of Quaker's field personnel with the factory, to provide assistance on preliminary engineering, specifications and service.

◆

SKIL CORPORATION.—*Skilsaw, Inc.*, Chicago, has changed its name to Skil Corporation.

PERSONAL MENTION

Bessemer & Lake Erie

M. A. FORTUNE, traveling car inspector at Greenville, Pa., has retired after 43 years of service with the road.

M. R. SEIPLER appointed traveling car inspector at Greenville, Pa.

Canadian National

R. T. WILLIAMS, locomotive foreman at Truro, S. S., appointed assistant superintendent motive power and car equipment, Newfoundland district, with headquarters at St. John's, Newfoundland.

Born at Totting, England.

Career: Entered service of CNR as a machinist apprentice at Moncton, N. B., in March 1924. Became a machinist at St. John's in March 1934; assistant foreman in November 1943; assistant locomotive fore-

(*Continued on page 149*)

man at Halifax, N. S., in December 1944, and locomotive foreman at Truro in July 1946.

R. M. VEENIS, locomotive mechanical engineer at Montreal, appointed mechanical engineer, Central region, with headquarters at Toronto.

Born at Sudbury, Ont.

Education: After war service studied for a mechanical engineering degree at University of Toronto.

Career: Became a machinist apprentice on the CNR in 1938. Appointed superintendent of stationary steam plants at Toronto after graduation; mechanical engineer at Montreal in 1950, and locomotive mechanical engineer for the system early in 1952.

K. W. THOMPSON, mechanical inspector at Montreal, appointed locomotive mechanical engineer at Montreal.

Career: joined CNR at Toronto in 1930. Became a machinist in 1939, after serving as a machinist apprentice at Toronto and Stratford, Ont. Served successfully as inspector of motive power and car equipment at Toronto; assistant foreman in the motive power department at Stratford; and locomotive foreman at London, Ont., until his appointment as mechanical inspector at Montreal in 1951.

Canadian Pacific

JOHN DAVIES, locomotive foreman at Brandon, Man., transferred to position of locomotive foreman at Kenora, Ont.

PERCY CRAWFORD, locomotive foreman at Kenora, Ont., has retired after 47 years' service.

H. W. GILLETT, No. 1 shop foreman at Brandon, Man., appointed locomotive foreman at Brandon.

Chicago & North Western

H. H. MAGILL, superintendent motive power, has had his jurisdiction extended to include all points of the C&NW and a portion of the Western Division of the Chicago, St. Paul, Minneapolis & Omaha from a point south of Sioux City to and including Omaha, the lines between Sioux City and Norfolk and branches to Crofton and Bloomfield.

E. W. GEBHARDT has been appointed superintendent car department, with headquarters at Chicago.

W. P. MILLER has been appointed assistant superintendent motive power—diesels, System Lines, with headquarters at Chicago.

A. T. HITCHCOCK has been appointed superintendent of locomotive operation.

SAM FESUS has been appointed general supervisor, freight and passenger cars, with headquarters at Chicago.

W. H. MCAMIS has been appointed superintendent locomotive and car shops at Chicago Shops.

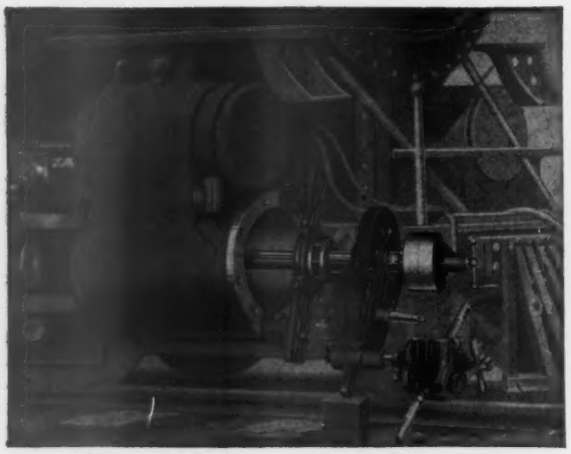
O. P. JONES has been appointed district master mechanic with jurisdiction over the Galena Division, Southern District of Galen Division, diesel shop at 40th Street, Chicago electrical shop and diesel locomotives operating the Chicago area.

(*Continued on page 152*)

Backed by
40 years'
"know how"
in producing
better brush grades
for specific
applications

STACKPOLE
Diesel-electric
BRUSHES
STACKPOLE CARBON COMPANY
St. Marys, Pa.

BRUSHES FOR ALL ROTATING ELECTRICAL EQUIPMENT
BEARING MATERIALS • BRAZING FURNACE BOATS
CARBON PILES • CLUTCH RINGS • CONTINUOUS CASTING DIES • DASH POT PLUNGERS • FRICTION SEGMENTS
RAIL BONDING MOLDS • RESISTANCE WELDING AND BRAZING TIPS • SEAL RINGS
TROLLEY AND PANTOGRAPH SHOES . . . *and dozens of carbon-graphite specialties*



A ROOKSBY PORTABLE BORING BAR saves time, gets a locomotive back to work sooner because it rebores cylinders in place, right in the roundhouse instead of the backshop. Accurate too, as well as fast, for all Rooksby tools have inbuilt ruggedness and precision. Other Rooksby portable machines for valve chamber boring, crank pin turning, and cylinder flange facing.

No need to "backshop" a locomotive for this job! . . . Rebore cylinders *right in the roundhouse* with a

ROOKSBY

E. J. ROOKSBY *and Company*

1042 RIDGE AVE.
PHILADELPHIA 23, PA.

Search your plant for iron and steel scrap . . . help our country to get enough steel

It takes scrap . . . to make steel.

Multiply the amount of iron and steel scrap in your plant by 2 . . . that's the amount of steel that could be made if that scrap were salvaged.

Today, there's not enough scrap coming in from normal sources to keep steel mills and foundries producing at capacity.

YOUR JOB IS CLEAR
—GET IN THE SCRAP
IN ORDER TO KEEP STEEL COMING

NON-FERROUS SCRAP IS NEEDED TOO!

WHEN CRITICAL
MATERIAL IS SCARCE—

Repair **POWER CABLES** with

AMP SOLDERLESS

CONNECTORS

HEAVY DUTY PNEUMATIC TOOL #69015

Either "STUB" or conventional side position crimping with AMP's double-handled Pneumatic Tool. Interchangeable jaws for wire sizes #6 to #1/0.

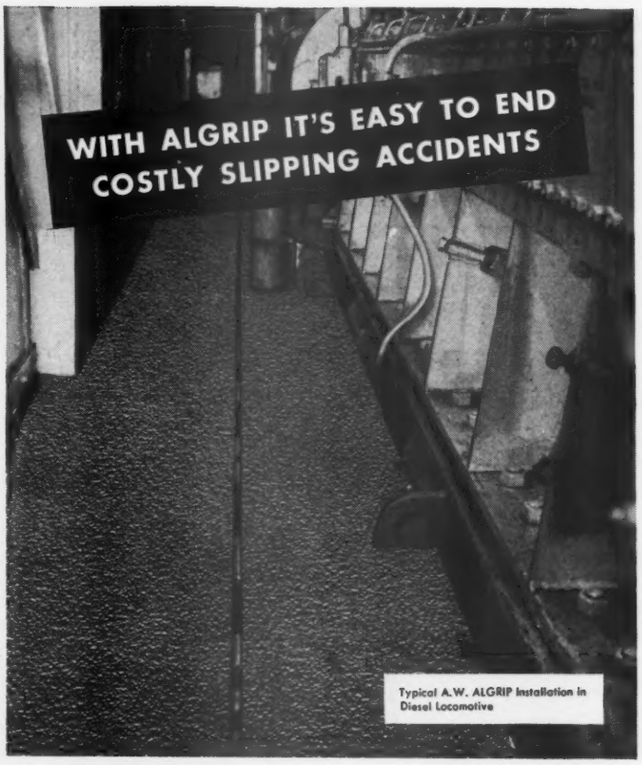
SOLISTRAND® BUTT CONNECTORS

Can be used on solid, stranded or irregular shaped wire. These pure copper connectors make strong, vibration-proof permanent splices #22 to #4/0.

AMP

AMP TRADE MARK REG. U.S. PAT. OFF.

AIRCRAFT-MARINE PRODUCTS, INC.
2100 Paxton Street, Harrisburg 13, Pa.



This Revolutionary Abrasive Floor Plate Protects Employees and Passengers Against Slipping

A.W. ALGRIP is the one and only ABRASIVE ROLLED STEEL Floor Plate. It is made by rolling abrasive grain, the same type used in grinding wheels, uniformly as an integral part of the upper portion of steel floor plate. Wet or dry A.W ALGRIP prevents slipping even on steep inclines. There are applications for ALGRIP wherever men walk or climb.

ALGRIP is ideal for installation on platforms, ramps, walkways, bridges, catwalks, signal towers and on rolling stock. ALGRIP is light in weight but high in strength and can stand severe abuse without cracking.

Write today for complete information or use coupon below for a free copy of booklet A24.

There's Never A Slip On A.W. ALGRIP

Even on Steep Inclines A.W. ALGRIP is Non-Slip.

A. W. ALGRIP guards against slipping on railroad car platforms and trap doors.

Over 125 Years of Iron and Steel Making Experience

A. W. ALGRIP ABRASIVE ROLLED STEEL FLOOR PLATE

ALAN WOOD STEEL COMPANY
CONSHOHOCKEN, PA.

Gentlemen: Rush me complete information and a FREE copy of your 8-page A.W. ALGRIP Booklet A24.

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Other Products: PERMACLAD Stainless Clad Steel • A. W. SUPER-DIAMOND Floor Plate • Plates • Sheets • Strip • Alloy and Special Grades

MICHIGAN CITY CAR BUILDER USES *NELWELD* IN TOP-EFFICIENCY PRODUCTION

Split-second application of Nelson studs on freight car end assembly. Special lightweight template jigs are used to accurately locate the studs.

The Michigan City plant of Pullman-Standard Car Mfg. Co. uses modern, proved methods and equipment to maintain its established policy of production efficiency. To secure furring strips and freight car component parts, the Nelweld method and Nelson granular flux-filled studs are used.

With the Nelweld method, workmen "take the tool to the job". The lightweight portable Nelweld gun quickly end-welds studs to car sections at the most advantageous stages in the production sequence. This results in:

- . . . **reduced handling of car ends.**
- . . . **faster installation of the required fasteners.**
- . . . **increased production and lower costs.**
- . . . **improved quality by eliminating holes in in the car ends and providing smooth, corrosion-free exteriors.**

Full technical information and Nelweld Engineering Service are available to show you how Nelweld advantages can bring cost-saving results to your fastening operations. Contact your nearest Nelson representative or Dept. R-4, Lorain, Ohio.

Fasten it Better...at Less Cost, with NELWELD

NELSON STUD WELDING

DIVISION OF GREGORY INDUSTRIES, INC., LORAIN, OHIO

(*Continued from page 149*)

A. M. SCOLARO appointed general foreman (days) at Proviso, Ill.

Erie

WALTER G. COLEMAN appointed assistant of supervisor locomotive operations, with headquarters at Jersey City.

Missouri Pacific

C. R. SMITH, master mechanic, Memphis division, and also master mechanic of the Union Railway of Memphis, has retired after 41 years of service.

C. H. MCAMIS, master mechanic at Monroe, La., appointed master mechanic, Memphis division.

E. M. VANDIVER, master mechanic at Kansas City, Mo., appointed master mechanic, with headquarters at Monroe, La.

A. J. DANIELS appointed master mechanic, with headquarters at Kansas City, Mo.

New York Central

D. D. FERRIS, assistant master mechanic at Harmon, N. Y., appointed terminal foreman at Harmon.

F. E. EDWARDS appointed assistant master mechanic at Harmon, N. Y.

E. L. HYATT appointed master mechanic, with headquarters at Harmon, N. Y.

J. J. WRIGHT appointed master mechanic, with headquarters at Boston.

H. R. MCILVEEN appointed general diesel supervisor—locomotive maintenance.

Norfolk & Western

O. F. HARK, assistant superintendent motive power-personnel has been appointed assistant general superintendent motive power-personnel. The position of assistant superintendent motive power-personnel has been abolished.

C. E. POND, assistant to superintendent motive power has been appointed assistant superintendent motive power-car.

C. S. PATTON, JR., general foreman, locomotive department, Roanoke Shops, has been appointed assistant to superintendent motive power.

R. M. STICKLEY, JR., general foreman—foundry, has been appointed general foreman, locomotive department, Roanoke Shops.

J. A. GEARHART, foreman, machine shop, Roanoke Shops, has been appointed general foreman-foundry.

R. D. STONE has been apointed machine shop foreman at Roanoke. Mr. Stone was formerly assistant machine shop foreman.

E. E. BARTON has been appointed assistant machine shop foreman, Roanoke Shops. Mr. Barton was formerly tool room foreman at that point.

C. R. COLEMAN, foreman—Roanoke wheel shops, succeeds Mr. Barton as tool room foreman.

D. F. KERFOOT, gang leader in the Roanoke wheel shop, has been appointed foreman of the wheel shop.

THE IMPROVED
Exide-Ironclad
BATTERY

YOUR BEST BATTERY BUY *AT ANY PRICE*

. . . Because it assures you quick break-away and fast acceleration of engine to firing speed . . . high power reserve *at all times* for positive operation of control equipment . . . high availability—uninterrupted on-line service . . . low costs of operation, maintenance, depreciation . . . inherent safety—plus clean, quiet operation.

Some of the many outstanding features:

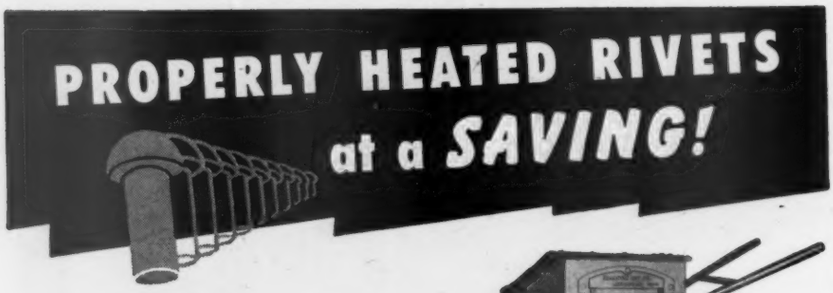
The long-life grids now contain corrosion-resistant SILVIUM • New polyethylene insulating tube sealer helps to maintain the high battery capacity for a longer working life • Improved negative plates • New sealing compound • Seamless shock-proof jar • New unbreakable plastic vent plugs.

Types, sizes and capacities for all makes of diesel locomotives—main line, switching, industrial.

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 2
Exide Batteries of Canada, Limited, Toronto

"EXIDE-IRONCLAD" and "SILVIUM" *Reg. T. M. U. S. Pat. Off.*

1888 . . . DEPENDABLE BATTERIES FOR 64 YEARS . . . 1952



with a JOHNSTON RIVET FORGE!

AVAILABLE WITH SEMI-PNEUMATIC TIRES.

The Johnston Rivet Forge is outstanding for its ability to hold adjustment and operate steadily without attention. It's available either with steel wheels or equipped with semi-pneumatic tires that absorb vibration and roll along smoothly.

Write for Bulletin R-801!

Over Thirty Years Experience in Design and Manufacture of Burners • Blowers • Furnaces • Rivet Forges • Fire Lighters • Tire Heaters • And Allied Equipment

THE JOHNSTON LINE OF DEPENDABILITY

JOHNSTON MANUFACTURING CO.
2825 EAST HENNEPIN AVE.
MINNEAPOLIS 13, MINN.

ENGINEERS & MANUFACTURERS OF INDUSTRIAL HEATING EQUIPMENT

Northern Pacific

HENRY G. BURNHAM, engineer of tests at St. Paul, has retired after 40 years of service.

H. BRUCE HOESLY, assistant engineer of tests, appointed engineer of tests at St. Paul.

Southern Pacific

E. J. CARTER, office manager in office of general superintendent of motive power at San Francisco, appointed assistant to general superintendent of motive power at San Francisco.

PERSONAL MENTION

Obituaries

E. S. SMITH, 84, who retired as master car builder of the Florida East Coast on November 1, 1951, died at St. Augustine, Fla., on September 9.

New Devices

(*Continued from page 128*)

nently set into the 10 oz. flannel. U. S. Testing Co. reports show that the plastic dot fabric outlasts the 10 oz. flannel fabric by well over a 2:1 ratio.

Introduced by Riegel Textile Corporation, New York 17, these gloves cost slightly more than standard types. The new product is said to retain all of the lightness, flexibility and comfort found in regular canton flannel gloves.

◆

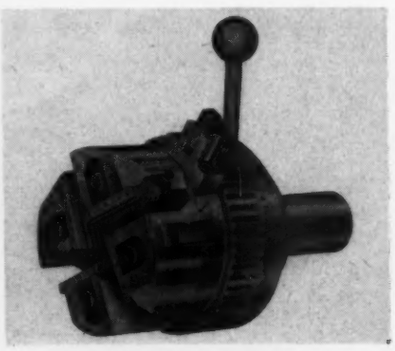
Pressure Instrument Test Gage

Periodic checks of pressure instruments such as controllers, recorders and indicators can, in many instances, save process fluid and otherwise reduce operating costs. Designed for this service is the 6 in. Model P Test Gage, made by The Foxboro Company, Foxboro, Mass.

The device is furnished in ranges of 0-30 in. of mercury up to 0-10,000 lb. per sq. in. pressure and is accurate within 0.5 per cent of the total scale throughout its range. Tapered pipe male thread connections are provided.

Its case is constructed of cast aluminum and the measuring element is either of steel or beryllium copper. The movement consists of a chrome-plated steel pinion, segment and arbor, monel plates and a stainless steel hairspring. Measurement is indicated on an easy-to-read dial.

◆



Self Opening Die Head

A stationary, self-opening die head with a range from No. 4 to ⅝ in. dia. has been designed for application to turret lathes, hand screw machines, and automatic screw machines employing a stationary type head.

Named the 5HH Landmatic Head by its manufacturer, the Landis Machine Company, Waynesboro, Pa., the device contains only a few working parts. A new type size adjustment mechanism has been designed to provide positive locking action.

Opening action is obtained by interrupting the forward travel of the turret slide or carriage. If this pull off opening action is not desired, the head may be opened by hand. Closing is achieved by hand. Chaser holders operate in dove tail slots in the head body.

◆

Screw Cover Thermocouple Head

This product is recommended wherever protection against weather and corrosion is required for terminal connections of thermocouples and high speed resistance thermometer bulbs. Typical users of the device developed by the Minneapolis-Honeywell Regulator Company, Brown Instrument Division, Philadelphia 44, include power generator plants and stations, refineries and railroad shops.

Its base is of cast iron, zinc plated and coated with aluminum enamel for protection against attacks from corrosion. The cover is of same material and finish. Slots facilitate assembly with a wrench or screw driver shaft.

The single thermocouple terminal block, which is interchangeable in the head with the duplex thermocouple terminal block

LIFTS 1000 POUNDS at 20 feet a minute

. . . or 500 pounds at 42 feet a minute

- This latest CP AIR HOIST — with variable speed, rotary vane air motor — spots loads accurately, quickly; sets them down gently.
- New design, trouble-free throttle valve provides sensitive control from an almost imperceptible creep to full speed.
- Air motor cannot overheat — no shock hazard — no spark hazard — no switches to maintain.
- Self-locking worm gear provides automatic brake — no brake bands to adjust or replace.
- Weighing only 57 pounds, the CP AIR HOIST can readily be carried by millwright to any location.
- Furnished in 300, 500, 700, and 1000 pound capacities.

Write for a copy of Bulletin SP-3027

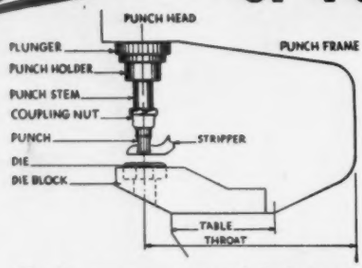
CHICAGO PNEUMATIC TOOL COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

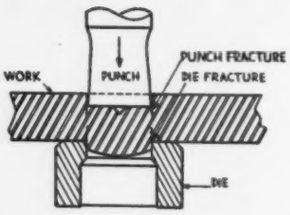
CP Fiftieth ANNIVERSARY

"Buffalo" Tips on Better PUNCHING

Care and Selection OF PUNCHES & DIES



Showing a common type of single punch unit. Multiple units of the gag or floating types are also commonly used.



Both punch and die cause fracture as punch goes thru steel plate.

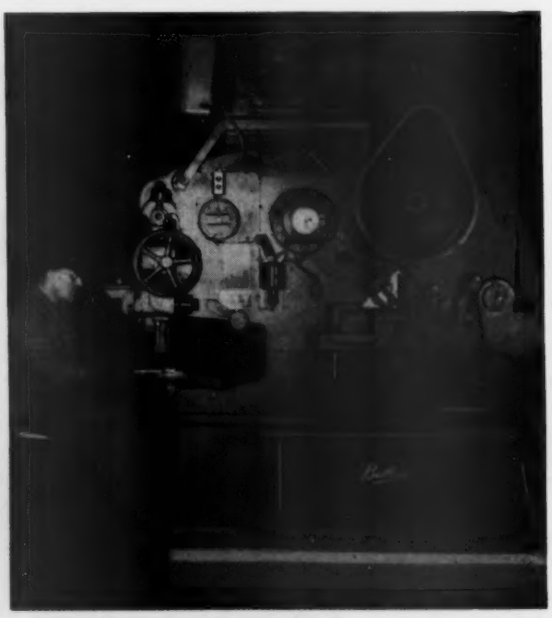
First, since the punch passes through the work and into the die, the die must be very slightly larger than the punch. For example, in punching ¼" and heavier materials, dies with a maximum clearance of 1/32" give best results.

Also, both punch and die should be set up to insure the punch entering the die centrally. If the punch strikes the edge of the die, either or both may be broken. However, proper clearance and proper alignment permit a smooth stroke with a minimum of burring.

It pays to keep punches sharp. It cuts down on breakage and gives the cleanest possible holes. Frequent application of heavy oil to the punches is of great importance, particularly when punching heavy and hard material, where considerable heat is developed in forcing the punch through the material.

FOR USEFUL INFORMATION

on metal fabrication, send for "PUNCHING—SHEARING—BENDING", popular 80-page pocket size easy-to-read booklet. $3.00 Postpaid. Send M.O. or check.



At right is a "Buffalo" Iron Worker, which not only punches, but shears plate, cuts round and square bars and angles. "Buffalo" multi-purpose fabrication machines like this are multiplying the speed of maintenance and production operations in railway shops, steel mills, other heavy industries. WRITE FOR INFORMATION on your metalworking problem!

75 YEARS

"Buffalo" MACHINE TOOLS

BUFFALO FORGE COMPANY

174 MORTIMER ST. BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING PUNCHING SHEARING CUTTING BENDING

and resistance thermometer terminal block, is molded of heat-resistant refractory material. The block accommodates No. 7 B. & S. gage or smaller wires and No. 12 B. & S. gage or smaller extension wires.

The duplex block accommodates No. 14 B. & S. gage or smaller wires and No. 12 B. & S. gage or smaller extension wires while the resistance thermometer terminal block can take No. 12 B. & S. gage or smaller extension wires.

◆

Solderless Terminal For Control Wiring

A solderless terminal developed especially for intricate control panel wiring has been announced by Aircraft-Marine Products, Inc., 2100 Paxton street, Harrisburg, Pa. Known as the Reinforced Ampli-Bond terminal, it was designed and developed to meet the exacting requirements of control panel wiring. In such work, due to close quarters, the outer plastic covering of a pre-insulated terminal may occasionally be pierced accidentally.

The terminal's design assures that no underlying conducting surface will be exposed even if the insulating sheath is pierced. This is accomplished by means of an insulated metal ring near the base of the insulation support sleeve. The ring gives all necessary strength to combat vibration and sharp bending, but does not communicate with the electrical connection farther up the barrel. It can still be installed completely with one stroke of a tool.

The reinforced terminals are now available in the 12-10 and 16-14 sizes, and in the near future will be available in smaller wire sizes. They are color coded for easy identification, inspection and quality control.

◆

BX Cable with Glass Insulation

An improvement in BX armored cable has been announced by General Electric's Construction Materials Division, Bridgeport 2, Conn. Sizes 14 to 10 A.W.G. of this cable will now utilize a glass braid instead of the customary cotton one. The glass braid, which is inorganic, will not rot and is flameproof. Most important, glass braid makes possible a smaller overall diameter of the cable. Reduction of the size of the

long service life at low cost!

For Dependability and economy, you can't beat Solid Journal Bearings. And there's no doubt about their long life . . . as high as 6½ million miles per car setout is what the records say.

All you need to know about N. B. M. solid journal bearings can be found in the following service-proved facts.

- ✓ Easiest to maintain—replacement takes minutes, without need for skilled labor.
- ✓ Simple in design—the only answer to unrestricted interchange.
- ✓ Lowest cost—save over 25 per cent on car cost; average only $20 per car on replacement.
- ✓ Most liberal tolerances—axles can be used and reused with simple roller burnishing.
- ✓ Lowest running friction—a single film of oil permits faster acceleration, lower running resistance—particularly at low temperatures.
- ✓ Lightest weight—up to 60 per cent less dead weight than any other type of bearing.

Behind National Bearing Division's reputation for dependable Journal Bearings lies 75 years of experience, backed by constant engineering research, production ability and extensive foundry facilities.

National Bearing Division . . . Serving America's Railroads since 1874 with a complete line of Journal Bearings, Engine Brasses and Bronze Parts.

AMERICAN Brake Shoe COMPANY

NATIONAL BEARING DIVISION

4938 Manchester Avenue • St. Louis 10, Mo.

PLANTS IN: ST. LOUIS, MO. • MEADVILLE, PA. • NILES, OHIO • PORTSMOUTH, VA. • ST. PAUL, MINN. • CHICAGO, ILL.

Rely on BUCHANAN
for a perfect electrical connection EVERY TIME!

Just One Tool for both
Splicing and Terminating

2 #18 to 3 #8 1 #16 to 1 #8

Buchanan pre-SURE connectors have established new high standards for electrical wiring efficiency. Now—a broad range of wire sizes can be spliced or terminated perfectly with a single pre-SURE tool. Vinyl plastic snap-on splice cap insulators insure constant insulation thickness.

Use the new pre-SURE connectors
always safe! ... always sure!

See for yourself why more and more Buchanan products are being specified and used. Write for catalog.

BUCHANAN
BULLETIN
BEPCO
heavy duty
MOLDED
TERMINAL BLOCKS
These precision-made blocks are molded in one piece to exacting specifications to insure outstanding performance even under extremely adverse service conditions. Now available in 4, 6, 8 and 12 circuit sizes. Screw or solderless types.

"The fastest growing name in the electrical industry"
BUCHANAN
ELECTRICAL PRODUCTS CORPORATION
Hillside, N. J.

Write for Catalog D-52

steel armor also gives a corresponding reduction in weight which makes the cable easier to handle and carry. The smaller size also means easier pulling through drill holes and improved resistance to impact and crushing.

The new cable fits all standard fittings and is listed by the Underwriters' Laboratories, Inc.

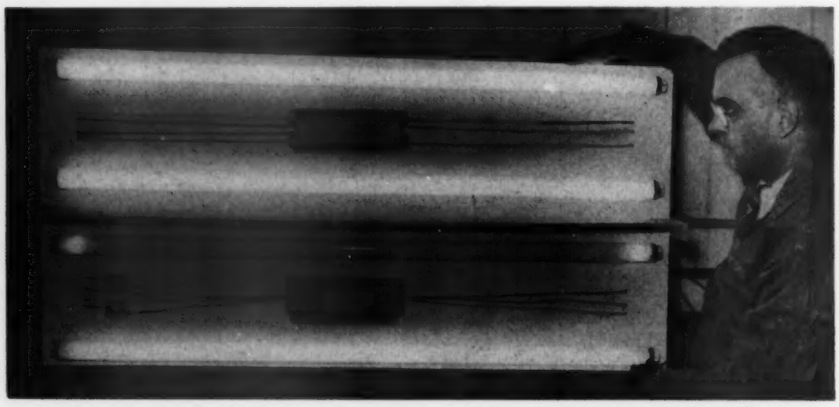
◆

Smooth-Start Fluorescent Lamp

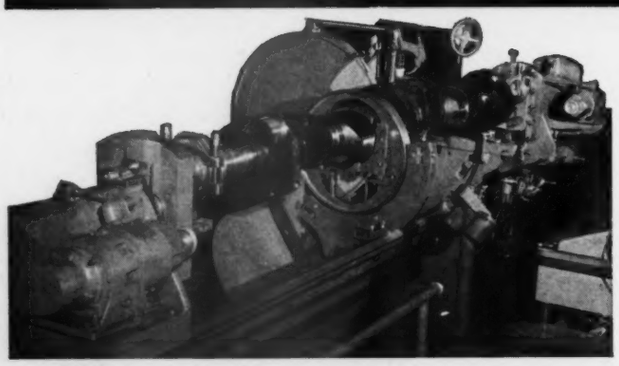
Development of a new type of fluorescent lamp which improves upon the performance of lamps now in general use has been announced by the General Electric Company, Nela Park, Cleveland, Ohio. The new lamps start quickly and smoothly without the aid of external starters.

Named Rapid Start, the lamps are used with especially designed ballasts, and are intended only for new lighting systems. They are being made in the 40-watt size, most popular lamp for general lighting, and in the standard cool white color. Other colors are planned.

In a Rapid-Start lighting system, all lamps controlled by one switch will light promptly,—within about one second after being turned on. The manufacturer states



CRANKSHAFT GRINDING SERVICE



Established 1924 . . . 28 years experience grinding crankshafts! The most complete engine rebuilding shop in the Southwest!

THE LARGEST CRANKSHAFT GRINDING MACHINE IN THE WORLD USED IN AN INDEPENDENT REPAIR SHOP

★ HARD CHROMIUM PLATING SERVICE
★ CRANKSHAFT STRAIGHTENING SERVICE
★ MAGNAFLUX SERVICE

Four machines giving range from the smallest up to crankshafts with stroke of 16" and 200" O.A.L. Complete grinding service for locomotive, stationary, marine, automotive and compressor crankshafts. Undersized journals restored to size by hard chromium plating.

NATIONAL WELDING & GRINDING CO.
2929 CANTON ST. DALLAS 1, TEXAS

that the lamps will not blink or flicker at any time throughout their lives. The lamps operate in series, two on one ballast.

The lamps differ from conventional preheat fluorescent lamps in two principal respects: they employ a complex, triple-coiled cathode, and a water-repellent coating to insure reliable starting under high humidity conditions.

The illustration shows a comparison of the performance of two of the rapid start fluorescent lamps (top pair), with that of the conventional preheat lamps in general use today. The picture illustrates the comparative speed with which the improved lamps light up. No external starters are required.

◆

Hook-On Volt-Ammeter

A redesigned hook-on volt-ammeter with higher voltage and current ranges and a new pointer-stop mechanism has been announced by the Meter and Instrument Department of the General Electric Company.

Designated type AK-1A, the new instrument will measure alternating current on five scale ranges: 0-7.5, 0-30, 0-75, 0-300 and 0-750 amp. It can be used on both insulated and non-insulated conductors by simply hooking it around the power line. No separate transformers or additional equipment is required.

The instrument will also measure a.c. voltage on three ranges: 0-150, 0-300 and 0-750 volts. To use these ranges, the terminals are connected to the line, and a positive-action selector switch is turned to the desired scale.

The pointer-stop mechanism permits the user to quickly determine peaks in motor starting currents.

A dovetail joint on the instrument's magnetic jaws reduces errors caused by imperfect closing to less than 2 per cent where an ordinary butt joint might cause errors as high as 10 per cent.

The hook-on portion of the AK-1A is a split core transformer with its secondary winding tapped for different ratings and connected to a rectifier instrument through a range-changing selector switch. When the switch is thrown to any voltage-range position, the rectifier is connected to the binding posts through proper internal resistors. Voltage may be measured by connecting leads to the binding posts on the front of the instrument.

The instrument is shielded magnetically. Five hundred amperes in a conductor one foot away from the transformer causes negligible effect on the 300- and 750-amp. ranges, and less than 1 per cent error on 7.5-, 30- and 75-amp. ranges.

◆

Bench Type End-Finishing Machine

Pipe and tube deburring, reaming and facing operations, usually handled on machines such as lathes or by hand filing methods, can now be completed at speeds approaching special machine output, according to Pines Engineering Company, Aurora, Ill.

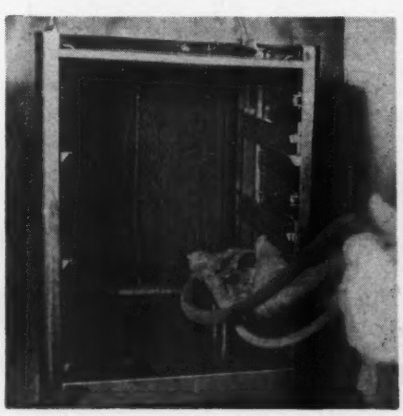
These operations can be performed on their new device, the bench type End-Finishing unit. This product is designed so that changeovers from one job to another can be made in about one minute. Interchangeable chuck inserts and tool holders for different operations are provided.

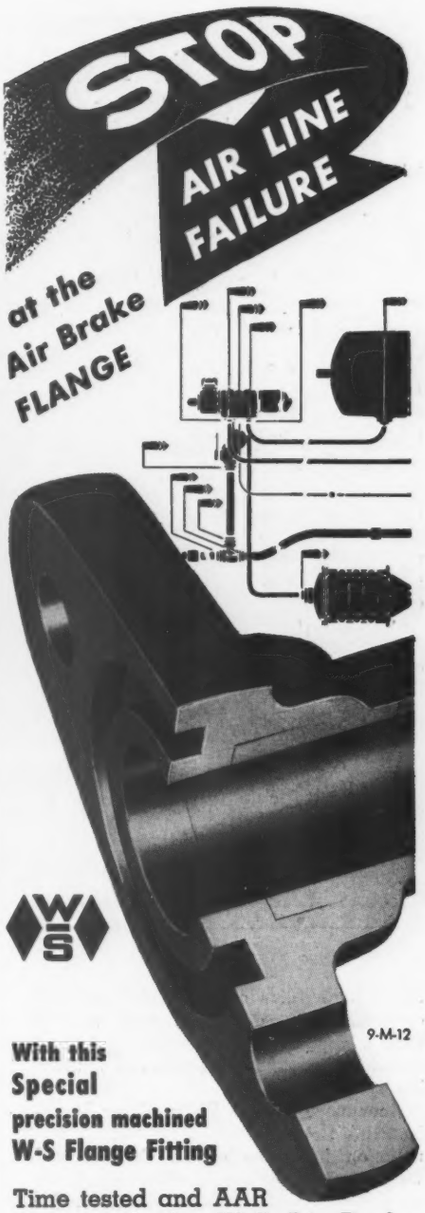
The machine handles stock up to 2 in. in dia. It is portable and has a three-speed sheave and a ½ hp. motor.

◆

High Solids Sound Deadener

Permits manufacturers of light metal equipment to give their products a solid feeling with sound-hushing ability. The product





With this Special precision machined W-S Flange Fitting

Time tested and AAR approved, the W-S Air Brake FLANGE is now standard equipment on thousands of cars — on many roads. It cuts the number of piping failures on air-brake systems . . . keeps rolling stock in service.

Drop forged for strength . . . it's lighter in weight, less cumbersome to handle because it's made in one piece. And, when positioned and welded, is shock and fatigue resistant.

Not one single failure reported in over 5 years of service . . . test it yourself and be convinced. Write for Bulletin R-1 to get more information.

DISTRIBUTOR PRODUCTS DIVISION

WATSON-STILLMAN

ROSELLE, NEW JERSEY

IDEAL

For Faster, Smoother Tube Rolling

IDEAL MASTER Tube Expanders

designed to withstand severe strains of power production —for the manufacture and repair of LOCOMOTIVE and other FIRE TUBE BOILERS.

No. 54-S . . . for rolling tubes in the FIRE BOX end. Has rolls 1¼" long. Expander will automatically draw tubes out against guard uniformly ¼" for beading.

No. 54-L . . . for rolling tubes in the SMOKE BOX END . . . has rolls 1⅞" long, for heavy sheets and where tubes project various distances beyond sheet.

Similar Ideal Tube Expander (No. 60) made for rolling and flaring tubes in one operation.

No. 54

See Your Dealer, or Write Us Today!

THE GUSTAV WIEDEKE COMPANY
DAYTON 1, OHIO

has a high solids content and is of fluid consistency that enables it to be applied with a wipe-on tool or spray equipment without fire-proof spray booths and ventilating systems.

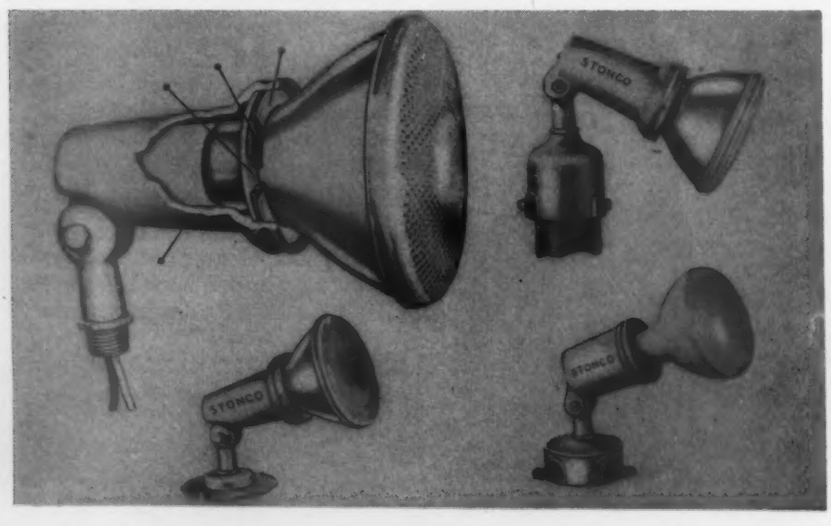
Announced by The Philip Carey Manufacturing Company, Cincinnati 15, the formulation has been named Carey Sound Deadener Nos. 40 and 41. Once dry, it can be protected with emulsion type paint. The product can be baked at temperatures as high as 325 deg. F. without loss of bond, blistering, flow or without streaking through the paint, except the lighter shades.

◆

Weatherproof Mount For Reflector Lamps

A weatherproof lamp holder for reflector type lamps has been developed by Stonco Electric Products Company, Kenilworth, N. J. It is called the Stonco Cushion-Seal Holder and makes use of a high-temperature, silicon rubber cushion-seal that hugs the neck of the lamp in a weatherproof seal, that is said to withstand the highest temperature to which the lamp may be subjected in outdoor service. By sealing the lamp low at its neck, and by exposing its hot spot area to open air cooling, lamps are reported to burn cooler and exceed rated lamp life. The cushion-seal adapts itself to fit all R-40 and PAR-38 lamps whether long, short or off-center. It also helps protect the lamp against vibration and shock.

The unit is made of non-corrosive cast aluminum with a glazed porcelain heatproof socket. The silicon cushion-seal is backed with an impregnated asbestos heat barrier and locked in place by a rigid aluminum reinforcing disc. The unit is furnished completely wired with lead wires extending beyond a universally adjustable swivel arm for mounting to ½-in. pipe, wall bracket, pipe slip fitter, or any of a number of standard interchangeable splice box accessories. It carries U.L. approval for use with medium base or mogul reflector lamps in the standard 150-, 200-, 300-, and 500-watt sizes.



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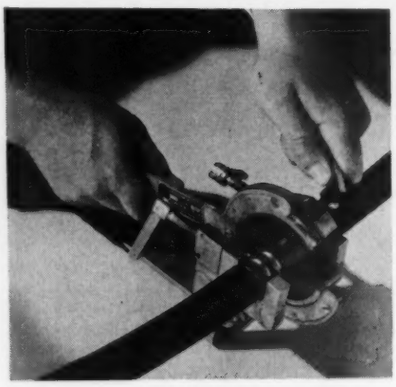

Splicing Connectors

The F. M. Anthony Company, 2022 Oakland avenue, Piedmont 11, Calif., is now manufacturing for railroad, as well as industrial, use a new line of electrical splicing connectors, terminals lugs, rubber and Neoprene insulating sleeves, and crimping tools under the name of Insul-Lock. The feature of this line is that it provides a single mechanical-type portable had-crimping tool which makes a full circumferential crimp and will crimp a range of wire and cable sizes from No. 4 up through 500,000 circular mils without changing dies or the application of heat. Yet the tool is light in weight (2¾ lb.), simple to operate and requires practically no maintenance. It works on a ratchet principle and rolls a crimp into the connectors and lugs.

The portable hand tool can be operated in tight places and is adapted to general industrial construction and maintenance wiring. It can be used in connection with a full line of two-way splicing connectors and terminal lugs for both flexible and standard stranded types of cable, also cable adaptors and other special fittings. For welding cable, pre-molded rubber and Neoprene insulating sleeves can be put on over their splicing connector with a special mounting tool. This saves time and makes the job permanent.

FOR EVERY REWIND JOB... there's a quality Irvington Insulation

For repairs and rewinds of traction motors, auxiliary motors and generators — for maintenance of signal equipment — look into the Irvington line of coated insulations and insulating varnishes.

OUTSTANDING IRVINGTON PRODUCTS INCLUDE:

Class "H" Insulations. Silicone Resin-impregnated Fiberglas*. Silicone Rubber-coated Fiberglas. Silicone Rubber-coated Fiberglas Tubing. Silicone Resin-coated Asbestos. Silicone Resin-saturated Asbestos. Teflon**-coated Fiberglas. Silastic*** Tape.

Class "B" Insulations. Varnished Fiberglas. Varnished Asbestos.

Class "A" Insulations. Varnished Cambric, paper, nylon, Orlon, silk, rayon. Irv-O-Slot slot insulation.

Insulating Varnishes — baking and air drying types. Oilproofing enamels.

Plastic Tubing, Tapes and Wire Markers.

*® Owens-Corning Fiberglas Corp. **® Du Pont ***® Dow-Corning

Ask for literature on any of these groups of Irvington time-tested products.

FRANKLIN RAILWAY SUPPLY COMPANY: EXCLUSIVE IRVINGTON REPRESENTATIVES IN THE RAILWAY FIELD.

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RM-11-52

Gentlemen:

Please send me technical literature on the following Irvington products .....

Name.....

Company.....

Address.....

City.....Zone.....State.....

WOULD YOU PAY EXTRA PENNIES

. . . TO SAVE THOUSANDS OF DOLLARS IN MACHINING COSTS?

Railroad shops can bore car wheels at as little as one-tenth the previous tool cost . . . turn them in one-third the former time.* They're doing it with Kennametal—in tool designs engineered to stand the gaff of railroad shop jobs.

A few pennies extra buys Kennametal instead of steel tools—and gives you the advantages of their design features, great strength, and long life which provide trouble-free tooling—easier set-up, fewer tool changes, reduced grinding time and trouble, fewer tools to stock.

In your shop Kennametal advantages may save thousands of dollars. Ask our district engineer to demonstrate. Kennametal Inc., Latrobe, Pa.

*Performance studies will be sent upon request.

KENNAMETAL
Modern RAILROAD SHOP TOOLING

33-8

STATEMENT of the ownership, management, and circulation required by the Act of Congress of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Title 39, United States Code, Section 233): of *Railway Mechanical and Electrical Engineer*, published monthly at Philadelphia, Pa., for November, 1952.

1. The names and addresses of the publisher, editor, managing editor, and business manager are:

Publisher, Simmons-Boardman Publishing Corp., 30 Church St., New York 7, N. Y.

Editor, C. B. Peck, 30 Church St., New York 7, N. Y.

Managing editor, H. C. Wilcox, 30 Church St., New York 7, N. Y.

Business manager, C. W. Merriken, Jr., 30 Church St., New York 7, N. Y.

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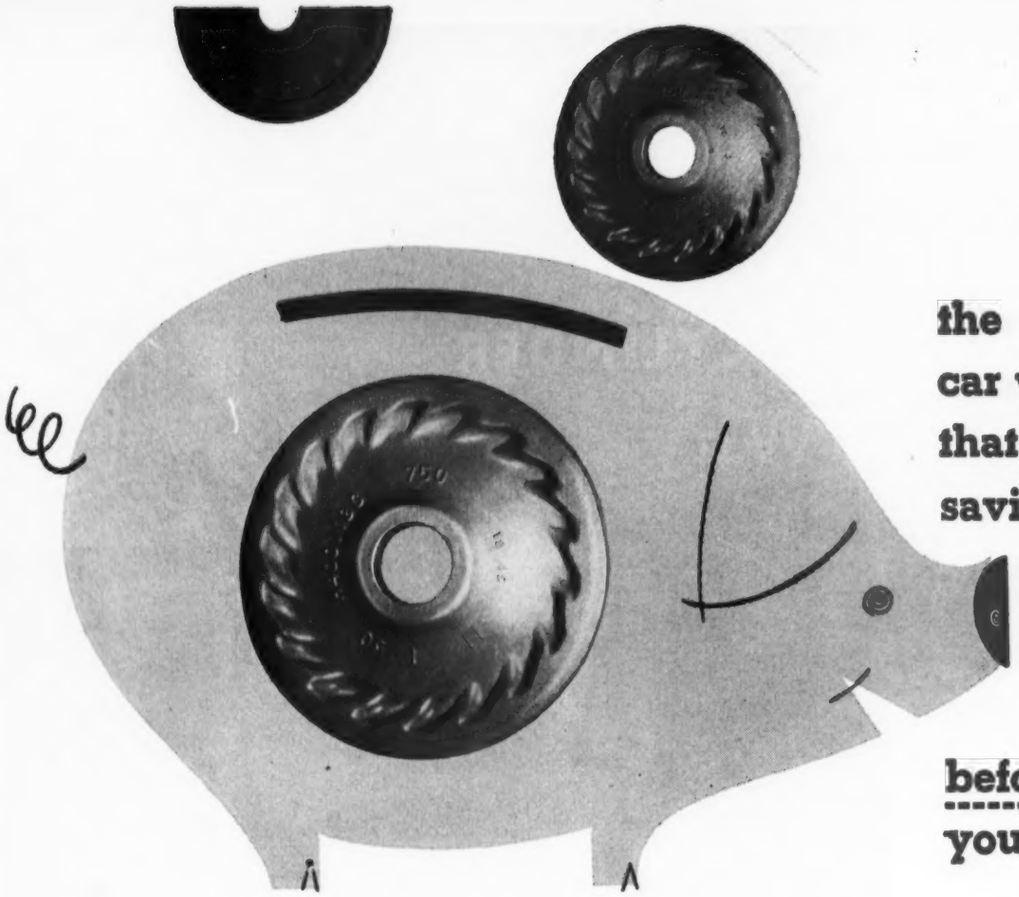
C. B. PECK,
Editor.

Sworn to and subscribed before me this 18th day of September, 1952.

EDMUND J. PUYDAK.

[SEAL] (My commission expires March 30, 1953.)



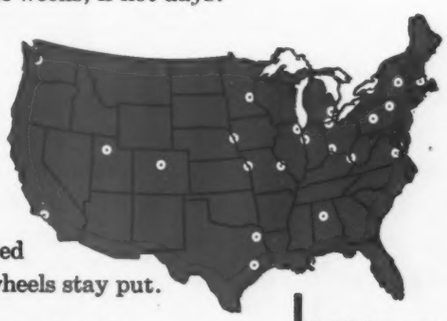
the car wheel that starts saving money before you buy it!

The railroad that runs its freight cars on AMCCW wheels literally saves money on every wheel it buys—before it buys it! Reason is that reliable, prompt, short-haul delivery schedules permit a *minimum* inventory. You don't have to order this wheel months ahead, or tie up capital to maintain a big stockpile. You *know* you can get the wheels you want from the AMCCW plant on or near your line . . . in a matter of weeks, if not days.

A smaller car wheel inventory is just as good as money in the bank. *Better* if you can put it to more profitable use.

But that's only the *START*...

Once the wheel is delivered, you save again, in the Wheel Shop. Boring is faster, easier on cutting tools. The gray iron hub greatly reduces the pressures required for mounting. And when they are mounted, AMCCW wheels stay put.



Quick, low-cost delivery of chilled car wheels from the AMCCW plant near you.

With the new heavier-tread, thicker-bracketed chilled wheels under your cars, you save again, in terms of increased ton-miles of service.

Even after an AMCCW wheel has lived its long life, the savings continue. Short hauls to the nearest AMCCW foundry, low exchange costs for new wheels, combine to keep replacement wheel costs to the very minimum.

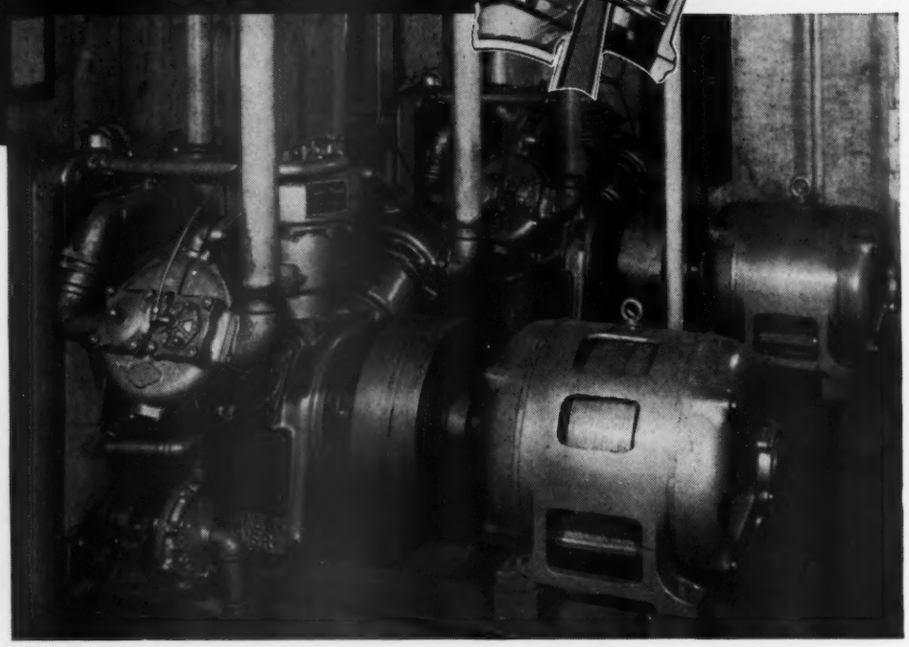
In good supply
Available locally
Short-haul delivery
Reduced inventory
Low first cost
Low exchange cost
Increased ton mileage
High safety standards
AMCCW plant inspection
Easier shop handling

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS

445 North Sacramento Boulevard, Chicago 12, Ill.

Albany Car Wheel Co. • American Car & Foundry Co.
Griffin Wheel Co. • Marshall Car Wheel & Foundry Co.
Pullman-Standard Car Mfg. Co. • Southern Wheel (American Brake Shoe Co.)

what you should know
about this
WATER-COOLED COMPRESSOR CYLINDER
... and Why



These two WB units provide compressed air for yard facilities of the St. Louis-San Francisco Railway at Wichita, Kansas.

If you are looking for an air compressor that runs cooler, delivers cooler air, requires less lubricating oil and lasts longer—then get acquainted with the Gardner-Denver *Water-Cooled WB*.

Completely water-jacketed compressor cylinders keep operating temperatures lower—keep cylinder wall temperatures uniform. Since there is less cylinder distortion, close manufacturing tolerances can be specified. As a result, lubrication is improved, oil pumping is eliminated, and cylinder wear is minimized.

So select Gardner-Denver WB Two-Stage Water-Cooled Compressors for your shop and yard installations, and save money on your compressed air costs. Available with water tube intercooler—or with combination radiator-intercooler for remote installations or where good cooling water is scarce. Send today for Bulletin WB-10.

SINCE 1859

GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., Toronto, Ontario

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

Read the facts about

AIRCO's NEW NO. 20 RADIAGRAPH

Up-to-the-minute in design, the No. 20 Radiagraph is Airco's newest service-proven portable gas cutting machine.

. . . So you'll know about the first gas-cutting machine designed to carry Aircomatic®, Heliwelding, Flame Hardening, and other *fabrication* equipment . . .

. . . So you'll be among the first to know how the No. 20 Radiagraph cuts circles and arcs, any length straight lines, simultaneous parallel lines — with single or double bevels, and irregular shapes.

. . . So you'll know how this 57-lb. one-man portable can be put to work for you, we've written up all the detailed information you need in a quick-reading, 8-page folder. To get your copy of the No. 20 Radiagraph catalog, please fill in the attached coupon and mail it to us today, or write us on your business letterhead.

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Gentlemen:

Send me the No. 20 Radiagraph catalog today.

Name_____ **Title**_____

Company_____

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One of the fast, sleek "Eagles" of the Missouri Pacific Lines moves through the final rinse at the Whiting Washer and is ready for its day's run on schedule.

A CLEAN FACE FOR TODAY'S TRIP!

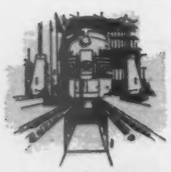
Before the start of every run, entire trains . . . from diesel locomotive to new, dome-type cars . . . are made shining bright with Whiting Train Washers. These machines wash cars in minutes, reduce cleaning time, help the railroads increase availability of rolling stock.

Washers and other items of Whiting transportation servicing equipment have long been vital factors in helping railroads speed overhaul and maintenance. Whiting is a name you'll also find on foundry cupolas, giant overhead cranes, metal-working machinery, the amazing Trackmobile and scores of other products . . . *all helping industry do more at lower cost!*

WHITING CORPORATION

15609 Lathrop Ave., Harvey, Illinois

OTHER WHITING RAILROAD PRODUCTS



Drop Tables

Electric Portable Jacks

Cross-Over Bridges

WHITING

TRANSPORTATION EQUIPMENT

Whiting Corporation also manufactures Materials Handling, Foundry and Aviation Equipment; Metal-Working Machinery and Swenson Equipment for the Chemical Process Industries

Kansas City Southern Streamliners

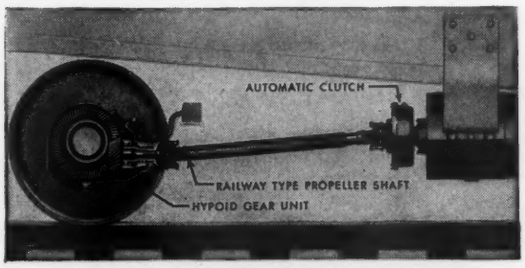
Spicer Generator-Drive Equipped

Deluxe travel facilities of the highest order are offered travelers between Kansas City and the deep South through the new *Kansas City Southern* streamliners.

There are chair cars with spacious lounges, picture windows, individual lighting and ample luggage space. The diners are divided into three rooms to create an intimate atmosphere. Tavern-lounge cars offer restful reading, lounging, entertainment and refreshment facilities. All compartments in the sleeping cars have wardrobes, toilets, circulating ice water, and temperature controls. Radio and wire-recorded music is provided in all passenger cars and sleeping rooms. The mail-baggage cars have wardrobes, toilet facilities, refrigerators and steam cookers for post office personnel; and berths, showers, wardrobes, and toilet facilities for dining car crews.

All this streamlined hospitality makes great demands upon electrical facilities such as lights, fans, radios, refrigeration, air conditioning, and other units. Ample and constant power for the generating units in the Kansas City Southern streamliners is supplied by Spicer Railway Generator Drives.

The Spicer Drive consists of a very simple application of long-lived hypoid gears and pinion mounted on the standard railway car axle. Features include high efficiency and economy, safety, quietness and smoothness. Write for full details and literature describing all the profitable advantages Spicer Positive Generator Drives make available to you.



This Spicer Railway Generator Drive is easily adaptable to old and new equipment

48 YEARS OF Spicer SERVICE

The Spicer Railway Generator Drive is manufactured, sold and serviced by

SPICER MANUFACTURING

Division of Dana Corporation

TOLEDO 1, OHIO

when the heat is on...

specify Okonite-Okoprene Diesel wiring

When Diesel locomotives burn up the mileage, there's always danger of burning up the wiring, too. High temperatures generated by a Diesel are rough on conventional types of wiring — that's why so many builders now specify Okonite-Okoprene Diesel Locomotive Wiring.

Okonite-Okoprene meets the flame test requirements of the Underwriters' Laboratories. To pass these tests a cable must not support combustion or communicate flame along the cables. In contrast to ordinary saturated fibrous coverings, Okonite's time-proved Okoprene sheath provides a barrier against continuous high temperature.

This tough Okoprene sheath withstands the other saboteurs of Diesel wiring, too. It is moisture resistant and mechanically tough, safeguarding the insulation against abrasion and other types of possible damage. Okoprene is particularly resistant to petroleum products in general use on Diesels, thus preventing swelling and softening of the insulation.

Okonite-Okoprene Diesel wiring is insulated with Okonite insulation — the same long-lived mineral-base rubber insulation that has been used so successfully for important electrical circuits by three generations of railroad men.

Bulletin RM-2078A gives full details of Okonite-Okoprene Type DEL Diesel Locomotive Wiring, for both conduit and exposed installations. Ask your Okonite representative, or write for your copy of this bulletin to: The Okonite Company, Passaic, N. J.

The best cable is your best policy

OKONITE OKONITE SINCE 1878 ***insulated wires and cables***

1214

You can put the Brakes on Beam Maintenance Costs!

Don't take it for granted that high maintenance costs are a necessary brake beam evil. Over a billion car-miles with ASF Cast-Steel Unit Beams have proved just the opposite—and now you can get the economy of this same one-piece construction in hanger-type beams, too!

THROUGH LESS MAINTENANCE...

Instead of eight or more parts per beam, here's a rigid, one-piece casting that *stays* rigid. Insures a positive linkage—with nothing to flex or work loose. False piston travel is eliminated. Fulcrum and heads are cast integral... and permanently positioned. In short, the only adjustment of the ASF Hanger-Type Beam ever required is to compensate for brake shoe wear!

AND LONGER SERVICE LIFE...

The higher strength of a heavily "beefed up" casting means higher safety, and it also means *longer life*. Performance of thick metal sections is unaffected by corrosion. And service life can be extended almost indefinitely... worn surfaces can easily be built up by welding; burned heads renewed by welding on new facings.

YOU SAVE DOLLARS!

The longer life and lower-cost maintenance of the service-proved ASF Cast-Steel Unit Beam add up to one thing: *fewer dollars spent keeping cars "on-line."* Your ASF representative can give you the facts on how the same low-cost dependability applies to the new *ASF Hanger-Type Beam.* Write us today.

AMERICAN STEEL FOUNDRIES
410 N. Michigan Ave., Chicago 11, Illinois
Canadian Sales:
International Equipment Co., Ltd., Montreal 1, Quebec

Mint Mark of ◯ Fine Products

ASF

CAST-STEEL HANGER-TYPE BRAKE BEAM
A.A.R.-Approved
Certificate No. 65

Setting a new standard f

d for anti-wear performance

An advance in railroad diesel lubrication that rivals the discovery of anti-sludge compounds!

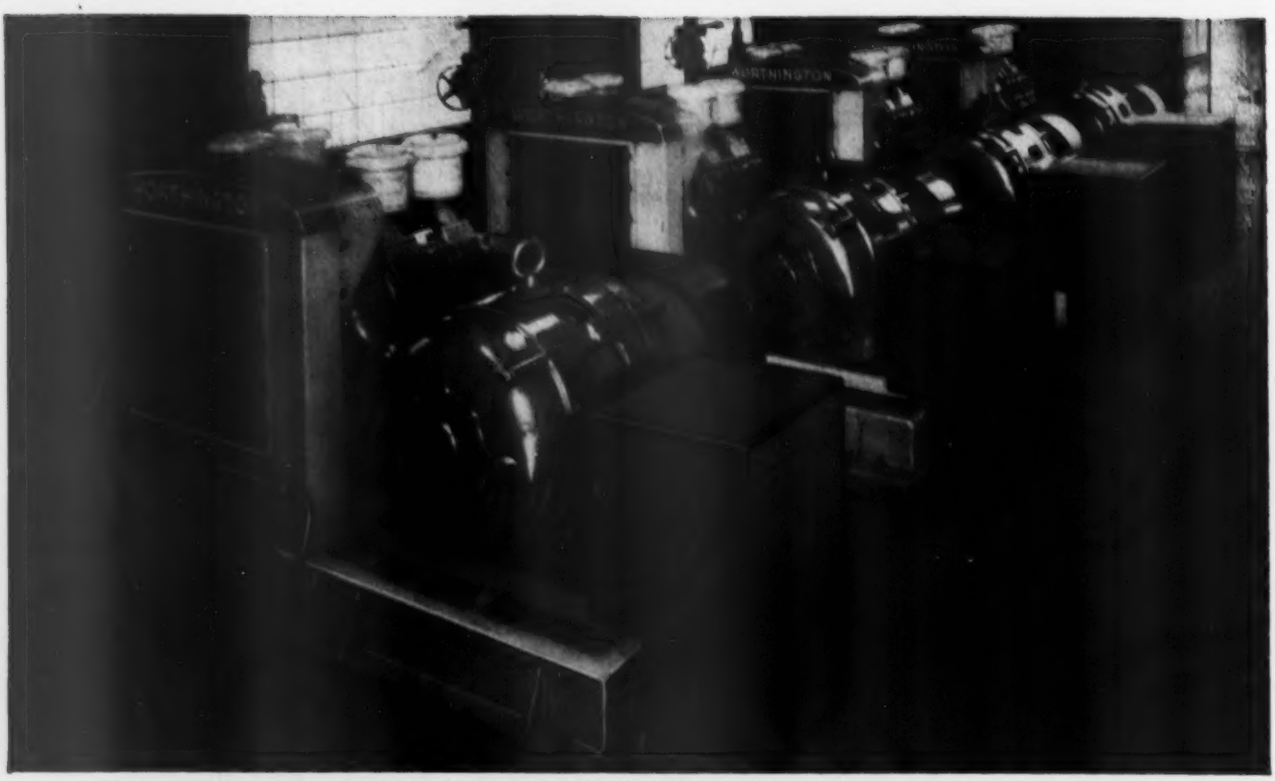
SHELL TALONA R OIL 40 combats the main causes of diesel engine wear so successfully that accepted wear standards must now be revised. *This gain is achieved without sacrifice of any basic lubricating function.*

Especially favorable is the wear reduction at the critical top-cylinder zone. By maintaining original cylinder-wall and piston-ring dimensions longer, engine efficiency stays at a high level and crankcase contamination is greatly reduced.

Investigate the anti-wear advantages of Shell Talona R Oil 40 for *your own* diesel units.

SHELL OIL COMPANY

50 WEST 50TH STREET, NEW YORK 20, NEW YORK
100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA
SHELL BUILDING, ST. LOUIS 3, MISSOURI



32ND ST., PITTSBURGH, AIR-COMPRESSOR STATION of The Pennsylvania Railroad Company, showing four of the five Worthington radial compressors, which make up a completely automatic system to supply air for charging the air brake system on cars, for emergency operation of track switches, and for lifting sand.

How Pennsylvania Railroad gets completely automatic operation from these Worthington Compressors

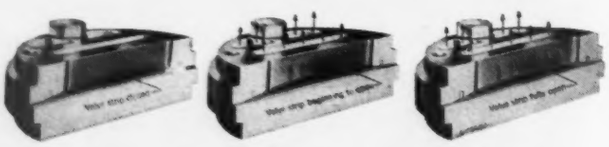
Some might call it "well integrated"—others might merely say "beautiful".

But however you look at it, this Pittsburgh yard compressor installation of the Pennsylvania Railroad is a model of order and efficiency. Any three of those clean-looking but rugged Worthington compressors make up a completely automatic system.

Here's how it works. One of the five units is selected to run continuously. A second unit is on constant speed control, while a third is available for automatic start and stop control. The remaining two compressors are available to furnish additional air in the event one of the large steam driven units at Pennsylvania Station Power Plant is shut down for repairs. In the event of power interruption with three compressors on the line, the three compressors will start up automatically in timed sequence rather than all-at-once—an important consideration from the standpoint of electrical starting load.

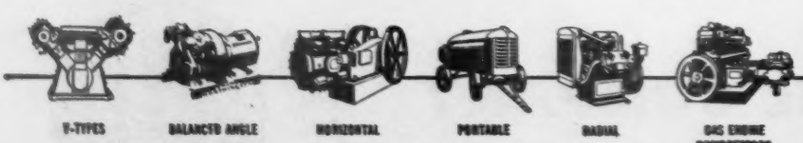
Worthington takes its hat off to the Pennsylvania R. R. Co. for setting up one of the most efficient compressor installations we've seen in any yard of this kind.

Write for more data on Worthington Radial Compressors in Bulletin H-630-B1 to Worthington Corporation, Vertical Compressor Division, Holyoke, Mass.



WHY DOES A WORTHINGTON PERFORM BETTER, LAST LONGER? Users can give you a number of reasons. Here's one: the exclusive Worthington Feather* Valve—lightest, tightest, most durable valve ever used. Cutaway shows the course of air through the valve. Other Worthington features: articulated connecting rods; completely filtered force-feed lubrication; fan cooling of isolated cylinders; Timken main bearings; and a range of capacities from 25 to 100 hp, 80-125 psi pressure with piston displacements from 142-538 cfm.

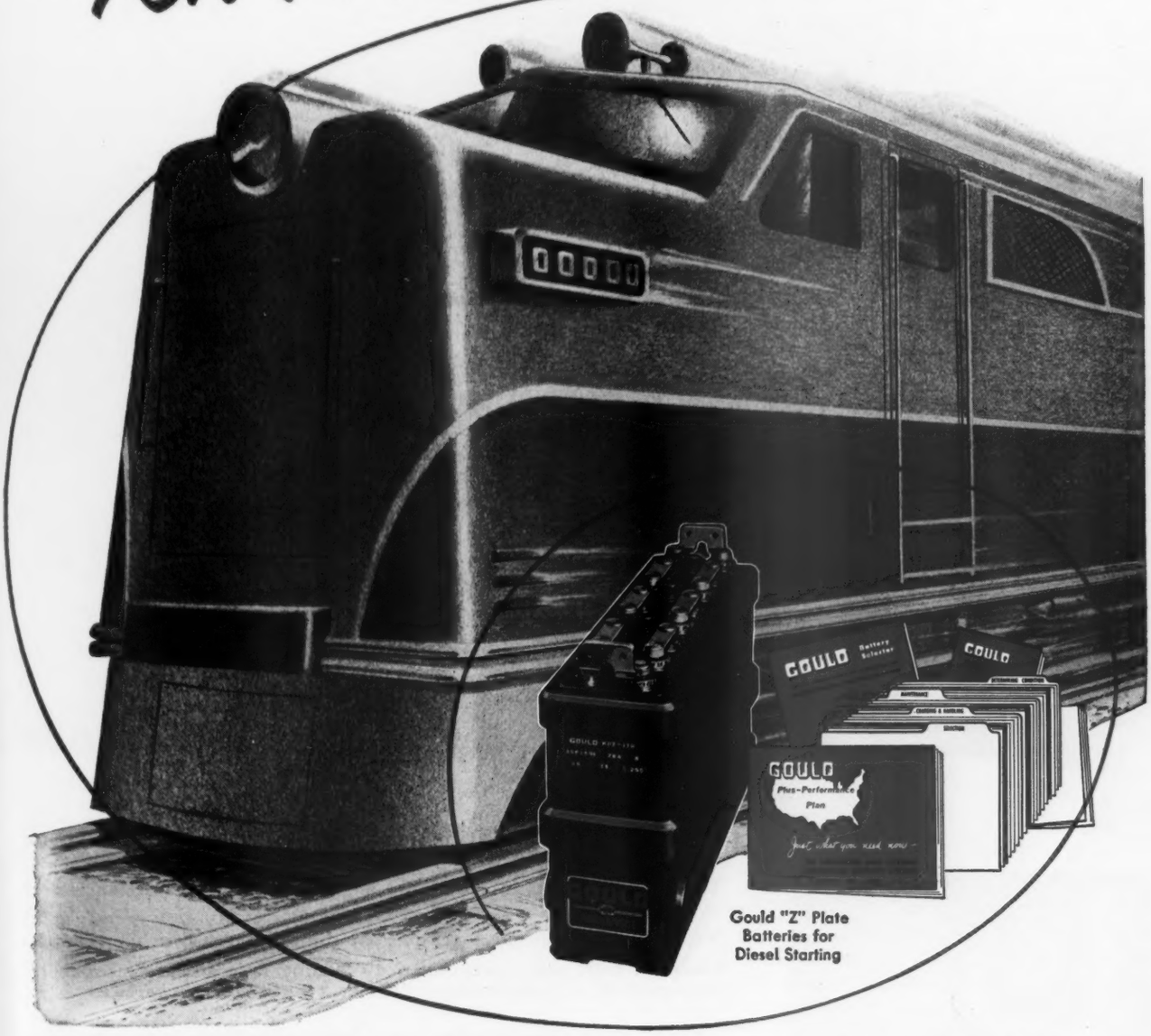
*Reg. U. S. Pat. Off. N.2.1



No Other Compressor Will Outperform a Worthington

WORTHINGTON
Compressors

PERFECT COMBINATION FOR FAST STARTS!



Gould "Z" Plate Batteries for Diesel Starting

You need a full-capacity, fully-charged battery to start a rugged, 2000 H.P. diesel unit, especially when the temperature is low. You can be sure of fast starts *any* time, in *any* weather by using Gould "Z" Plate Diesel Starting Batteries *and* the Gould Plus-Performance Plan to help you select, charge, maintain and determine the condition of your batteries. The library of valuable technical data comprising this plan is free to users of lead-acid starting batteries, regardless of make. Write Gould Battery Information Headquarters for details.

GOULD *Railroad Batteries*

GOULD-NATIONAL BATTERIES, INC., TRENTON 7, N. J.

Always Use Gould-National Automobile and Truck Batteries

As the modern Diesel outperforms OLD 999

Nailable Steel Flooring outperforms other freight car floors

"Class I railroads in the first four months of 1952 installed in service 883 new locomotives. 878 of these were Diesels."*

This is recognition of the Diesel engine's superior performance over other kinds of tractive power.

Naturally, there are good reasons for the railroads' switch to Diesels.

Likewise, more and more, America's leading railroads are recognizing the superiority of NAILABLE STEEL FLOORING for freight cars because:

- N-S-F and its exclusive nailing to steel feature mean greater security for lading of all kinds—and the nails used in blocking cannot damage the floor.
- N-S-F assures constant serviceability for boxcars and makes one type of gondola do the work of two.

These characteristics of N-S-F, made of N-A-X HIGH-TENSILE steel, mean greater structural strength for freight cars . . . greater efficiency in overall railroad operations.

*AAR Bulletin—May 19, 1952

N-S-F for NAILABLE STEEL FLOORING

PATENTS PENDING 52-SF-6

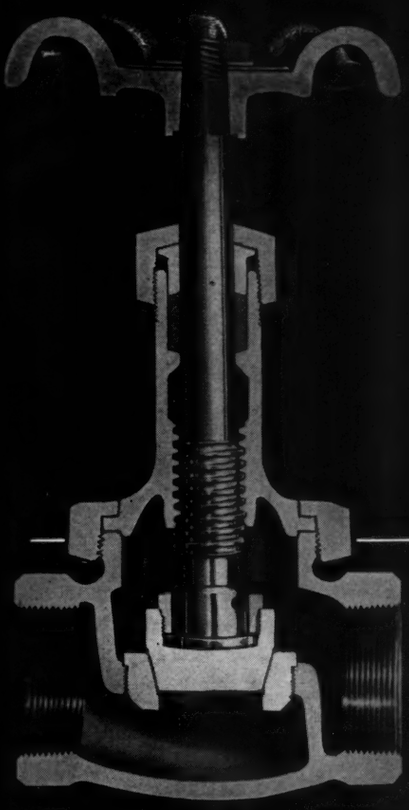
GREAT LAKES STEEL CORPORATION

STEEL FLOOR DIVISION • Ecorse, Detroit 29, Michigan

PRODUCER OF N-A-X HIGH-TENSILE STEEL

NATIONAL STEEL CORPORATION

Sales representatives in Chicago, Philadelphia, St. Louis, Atlanta, Omaha, Denver, San Francisco, Montreal and New York



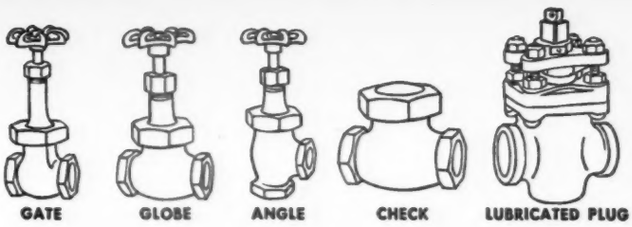
BRONZE

COMPLETE LINES OF BRONZE VALVES AND PIPE FITTINGS are manufactured by Walworth in a variety of types, pressure ratings, sizes, and patterns, including Walseal® Bronze Valves and Fittings for making Silbraz® joints.

Walworth also manufactures complete lines of valves and fittings — including Lubricated Plug Valves — made of steel, iron, and special alloys as well as bronze.

Walworth-made valves, pipe fittings, and pipe wrenches, total approximately 50,000 items—all sold through distributors in principal centers throughout the world.

Walworth engineers will be glad to help you with your problems. For full information call your local Walworth distributor, nearest Walworth sales office, or write to Walworth Company, General Offices, 60 East 42nd Street, New York 17, N. Y.



Bronze valves in gate, globe, angle, check, and lubricated plug types are manufactured by Walworth. Illustrated is a sectional view of a Walworth No. 225P Bronze Globe Valve. This valve has a working steam pressure rating of 350 psi at 550F (1,000 psi non-shock cold water, oil, and gas pressure). It features a renewable, plug type, stainless steel seat and disc, heat treated to 500 Brinell hardness.

WALWORTH

Manufacturers since 1842

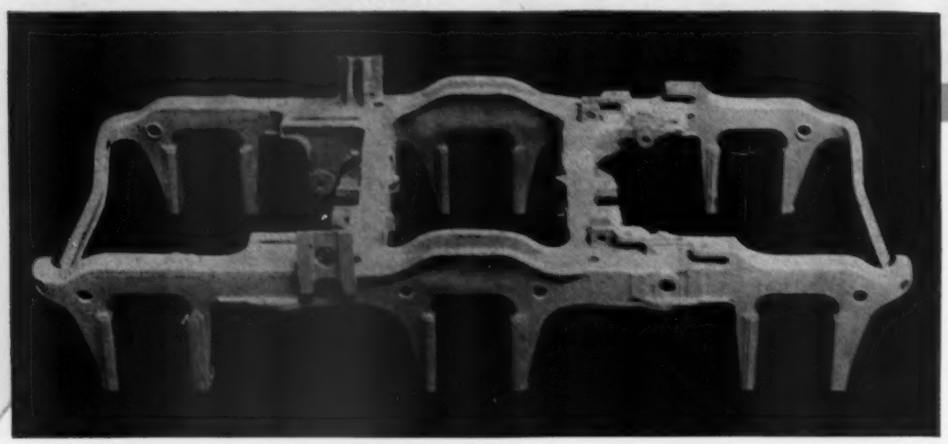
valves . . . pipe fittings . . . pipe wrenches

60 East 42nd Street, New York 17, N. Y.

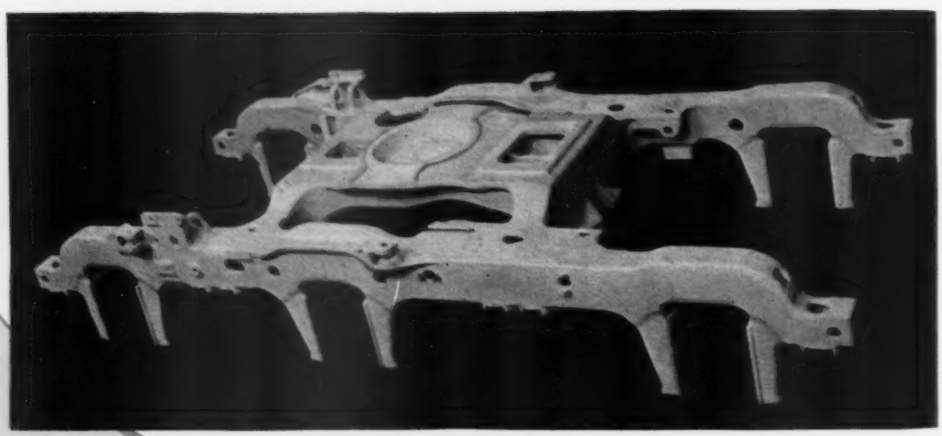
DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

COMMONWEALTH

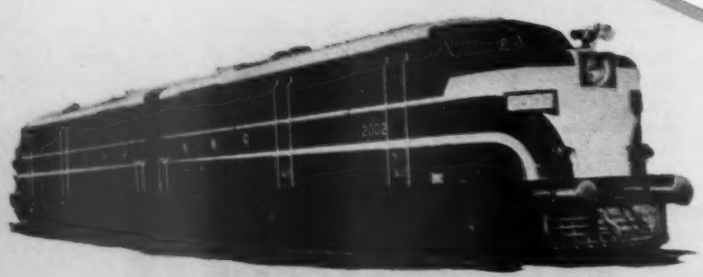
DIESEL LOCOMOTIVE TRUCKS...



Commonwealth
Motor Truck Frame
(2 motor type)



Commonwealth
Motor Truck Frame
(3 motor type)



3200 H.P. Freight and Passenger Locomotive
for North-Western State Railway, Pakistan

1600 H.P. Road Switcher for
Central Railway of Brazil

... In Service Throughout the World

More and more Diesel-Electric locomotives for service throughout the world are being built with COMMONWEALTH Motor Trucks. In Australia, Algeria, Brazil, Pakistan and Uruguay, as well as in North American countries, these trucks are materially helping to reduce locomotive maintenance costs and "out of service" time.

COMMONWEALTH One-Piece Cast Steel Truck Frames and Bolsters provide minimum weight with exceptional strength for rugged diesel service. Throughout the world performance has proven the outstanding dependability and economy of COMMONWEALTH Motor Trucks in every type of diesel locomotive operation. For all types of service specify COMMONWEALTH Trucks.

GENERAL STEEL CASTINGS

GRANITE CITY, ILLINOIS

EDDYSTONE, PENNSYLVANIA

1600 H.P. Road and Switching Locomotive for Central Railway of Uruguay

1600 H.P. Road Switcher for New South Wales Government Railways

Humping or Highballing . . .

DIESEL ENGINES THRIVE ON WIX ENGINEERED OIL FILTRATION

Precision construction . . . controlled density . . . uniform quality . . . self-contained sealing gaskets and many other WIX *plus* features add up to WIX Engineered Filtration. Whether for Lubricating Oil or Fuel Oil, the dollar and cents record of WIX Filter Cartridges shows a decided advantage for you.

There's a big difference between what happens to lubricating oil in a yard engine and in a main line locomotive. Factors such as speed, heat and contamination (to mention but a few) are completely different. Obviously these differences are reflected in the performance of the lubricating oil and filter cartridge. That is why WIX Engineered Filtration provides a choice of filtrants to suit *your* service conditions . . . enabling you to tailor *your* oil filtration to *your* needs. This facility is rolling up splendid performance records on more and more leading roads.

Whatever your preference, there is, in WIX Engineered Filtration the ideal construction for *your* particular service. There's the famous WIX interlapped white cotton thread construction . . . colored waste . . . amazing new resilient density blends . . . a special new filtrant . . . all engineered to rid lubricating oil of grit, dust and sludge! To keep engine performance UP and engine maintenance DOWN . . . *Clean It Up With WIX!* Write for particulars today!

wix

TRADE MARK REG.

ENGINEERED FILTRATION

RAILROAD OIL FILTERS

WIX ACCESSORIES CORP. • GASTONIA, N. C.
WIX ACCESSORIES CORP. LTD. • TORONTO, CANADA
WAREHOUSE STOCKS IN: GASTONIA • ATLANTA • ST. PAUL • CHICAGO • CLEVELAND • ST. LOUIS • OAKLAND

MOTOR WHEEL Deep Flange JOURNAL BOX LIDS

1. Hinge-pin supported by ¾" lid bearings. Worn holes and hinge-pin scoring eliminated.
2. Stops hold straight hinge-pin in position under spring pressure. NO TOOLS NEEDED TO INSERT OR SECURE HINGE-PIN.
3. Keeper-pin holds assembly during storage. After hinge-pin is inserted, hand pressure permits removal of keeper-pin WITHOUT USE OF TOOLS.
4. Coil spring and roller assembly, held snugly by sheared ears, lets lid open and close easily without wear on journal box lug.
5. Oil-tight center construction permits full articulation up, down, left and right to insure a tight fit.
6. Full pressed steel construction, 3/16" in housing and 5/32" in cover.
7. Opens 120° for easy access to journal.
8. Extended housing arm eliminates opening and closing strain on articulating point.

Give You 8 Superior Features plus Added Protection

NO TOOLS NEEDED

Neither the standard flange Motor Wheel Journal Box Lid illustrated above nor the Deep Flange model requires the use of tools to attach or detach.

The Deep Flange provides added protection from wind currents carrying foreign matter and moisture so harmful to efficient lubrication. Laboratory and field tests, plus the experience of thousands of lids in use, have proven the merits of the Deep Flange design.

NATIONAL RAILWAY SALES REPRESENTATIVE

T-Z RAILWAY EQUIPMENT CO.

8 S. Michigan Ave. Chicago 3, Ill.

MOTOR WHEEL CORPORATION

LANSING 3, MICHIGAN, U.S.A.

To assure highest mileage and utmost safety at high speeds

"Nickel Plate Road" uses U·S·S MULTIPLE-WEAR WROUGHT STEEL WHEELS

U·S·S WROUGHT STEEL WHEELS

One-Wear Freight Car Wheels
Multiple-Wear Freight Car Wheels
Passenger Car Wheels

Diesel Locomotive Wheels
Steam Locomotive Wheels
Electric Locomotive Wheels

Tender Truck Wheels
Electric Transit Wheels
Crane Truck Wheels

THIS IS ONE of 2500 70-ton hopper cars, equipped with U·S·S Multiple-Wear Wheels, built for the New York, Chicago & St. Louis Railroad in recent years. Their reputation for dependability in service has made U·S·S Multiple-Wear Wheels the favorites wherever heavy hauling is done.

Here are a few reasons why U·S·S Wrought Steel Wheels are better...

● On this recently developed semi-automatic wheel boring mill—the last word in speed and precision—wheel hubs are rough bored ¼" less than finished bore, or are finished bored to customer specifications.

● They're made right. On modern high speed machine tools like this, wheels are accurately machined to specified tolerances.

● A careful check of essential dimensions is the final inspection step that makes sure that U·S·S Wrought Steel Wheels meet customers' specifications. You get only the best.

on 3,000 70-ton cars

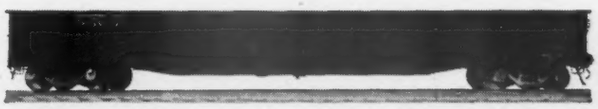
THE heavier wheel loads now carried, the greater distances traveled, and the high speed at which railroad equipment must move today have put a premium on wheel durability and safety.

That's why so many of the country's railroads like the New York, Chicago & St. Louis are installing U·S·S Multiple-Wear Wrought Steel Wheels on their heavy-duty equipment. These rugged wheels are good for the long run . . . *deliver more ton-miles per dollar than any other type wheel.* Here's why . . .

U·S·S Multiple-Wear Wrought Steel Wheels keep replacement cost *way* down. They're built to take the punishment of impact at high speeds and long, severe braking. Turned out in shops equipped with modern heat treating, forging and machining facilities U·S·S Wrought Steel Wheels are carefully controlled in every step of manufacture from the melting of the steel to the finished product. And they're backed by 47 years of wheel-making experience.

U·S·S Wrought Steel Wheels can be furnished either rim toughened or entirely quenched for other high-duty service. And two complete wheel shops—one at McKees Rocks (Pittsburgh), Pennsylvania, and the other at Gary, Indiana—make it possible to meet your requirements for steel wheels more efficiently . . . and more promptly.

The next time you order wheels for new equipment or for replacements, specify U·S·S Multiple-Wear Wrought Steel Wheels. No finer wheels are available anywhere.



THIS IS ONE of 500 70-ton gondola cars built for the Nickel Plate Road. Because years of hard, fast service are ahead for this car, it rolls on long-life U·S·S Multiple-Wear Wrought Steel Wheels. You can't get any better.

USS

UNITED STATES STEEL COMPANY, PITTSBURGH, PA. • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S WROUGHT STEEL *High-Duty* WHEELS

2-966

UNITED STATES STEEL

SCULLIN-V 50 TRUCK
STEEL CASTINGS MANUFACTURER
NEW YORK
CHICAGO
BALTIMORE
RICHMOND, VA.
SCULLIN
LATERAL VERTICAL
50
CUSHIONED MOTION
THE SMOOTHEST TRAF
BETWEEN LCL AND Y
SCULLIN STEEL CO.
SAINT LOUIS 10, MISSOURI

FOR CLASS 1 PERFORMANCE, SPECIFY

Lewis's

Sealtite railroad fasteners

* Santa Fe
* Great Northern Railway
* C&O Progress
* New York Central System
* Missouri Pacific Lines
* Union Pacific Railroad

*One of many leading railroads using Lewis Sealtite products.

The nation's great railroads use Lewis Sealtite fasteners. Accurately engineered, designed to do a better job, Sealtite products are tough, durable, made of finest grade metals for heavy duty. They meet the most exacting specifications.

More than 20 years of manufacturing experience have established Sealtite's top quality in the industry. Such famous Sealtite features as the patented fins, for better seating, Sealtite's accurate threading, for easy installation, and many others, have given Lewis Sealtite products a "Class I" reputation in the field.

The next time you specify fasteners, specify Lewis Sealtite, a complete line of first grade fasteners for America's leading railroads.

All Sealtite products are available in HOT-DIP GALVANIZED, SEALED-IN-ZINC finish, which stops rust and corrosion. Tests prove that the molten zinc bath gives Double-Life, greater economy through fewer replacements.

Serving 85% of America's Class 1 Railroads

See your Lewis representative, or contact factory for samples, prices, full details.

Lewis's BOLT & NUT COMPANY
504 Malcolm Ave. S. E.
Minneapolis 14, Minnesota

LOOK FOR THIS STAMP OF U QUALITY

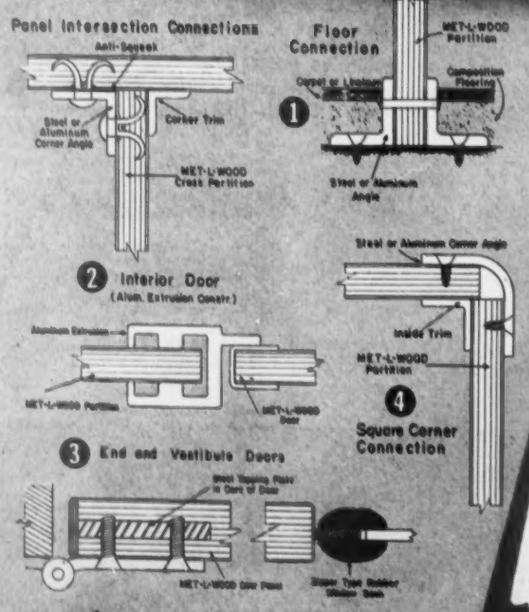
Sealtite Bolts available with Loktite Nut #2, washer nut, or std. sq. and hex. nuts.

MET-L-WOOD
METAL BONDED TO PLYWOOD

VERSATILITY
FOR MODERN CAR INTERIORS

Met-L-Wood walls provide a smooth, luxurious finish in addition to saving weight and simplifying construction.

MET-L-WOOD passenger car partitions, doors and paneling not only produce beautiful finished surfaces, but can also save up to 73%* in weight and a substantial amount of construction time. Shown at left, and described below are typical Met-L-Wood construction details. Full information on Met-L-Wood versatility in new or rebuilt cars will be furnished promptly on request. Write today.



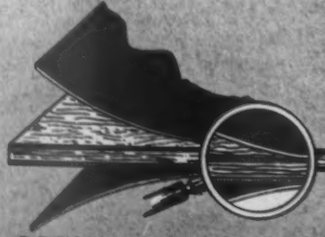
1 Panel intersections with Met-L-Wood can be made invisible from outside with the use of split rivets. Floor connections may be made in a variety of ways, one of which is shown here, using through-rivets and metal screws.

2 Interior doors of Met-L-Wood can be fitted with aluminum extrusion door stops; or the Met-L-Wood partition formed so that the door stop is an integral part of the panel.

3 Steel tapping plate inserts can be put in Met-L-Wood doors at proper places for solidly anchoring hinges and door-opening devices. Note simplicity of using zipper-type window sash with pre-formed Met-L-Wood window openings.

4 Square or rounded corners are made with Met-L-Wood panels and steel or aluminum corner forms. Corner forms can also be fastened with split rivets or through-rivets, as well as with wood or metal screws.

*Met-L-Wood panels 3/8" thick, with steel both sides, have a stiffness factor exceeding that of 1/4" solid steel plate, while weighing only 27% as much as steel!



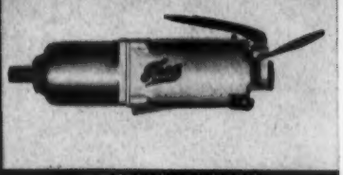
MET-L-WOOD CORPORATION

6755 West 65th Street, Chicago 38, Illinois

MET-L-WOOD • *STRONG... LIGHT... Smooth Finish... Sound Deadening... Fire-Resisting... Insulating*

NOW . . . A COMPLETE NEW LINE OF . . . .

Thor AIR IMPACT WRENCHES



¼" Capacity, 4 Models
Offset or Level Handle

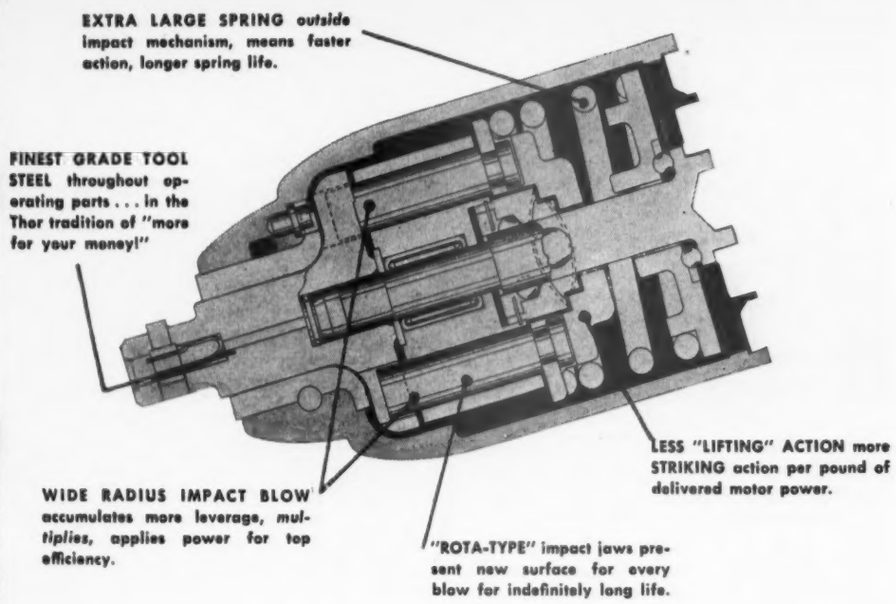
⅜" Capacity, 4 Models
Offset or Level Handle

⅜" Capacity, 4 Models
Side or End Grip Handle

¾" Standard Duty, 2 Models
Side or End Grip Handle

¾" Heavy Duty
Grip Handle

1¼" Heavy Duty
End Grip


EXTRA LARGE SPRING outside impact mechanism, means faster action, longer spring life.
FINEST GRADE TOOL STEEL throughout operating parts . . . in the Thor tradition of "more for your money!"
LESS "LIFTING" ACTION more STRIKING action per pound of delivered motor power.
WIDE RADIUS IMPACT BLOW accumulates more leverage, multiplies, applies power for top efficiency.
"ROTA-TYPE" impact jaws present new surface for every blow for indefinitely long life.

Exclusive new "rolling ball" cam drive operates at any angle under any conditions. Draws threaded fasteners down faster and tighter BEFORE IMPACTING for measurably longer tool life!

Thor is really in the Impact Wrench business with this great new line of hard-hitting tools for production and maintenance applications. Geared for quick delivery and *ready for any test.* Thor invites inquiries on any or all of the 19 sizes built to speed your operations and save you worthwhile money. Contact your nearby Thor branch office or write Independent Pneumatic Tool Co., Aurora, Ill.

Thor POWER TOOLS

INDEPENDENT PNEUMATIC TOOL COMPANY
AURORA, ILLINOIS

WATERTIGHT SEAL! Two layers of "Scotch" Electrical Tape No. 21 seal traction motor leads against moisture, dust and dirt.

Triple-thick plastic tape "buttons up" the sleeves on traction motor leads!

No wonder "Scotch" Electrical Tape No. 21 lasts so long on traction motor leads! It's three times as thick as ordinary plastic tape, gives plenty of protection against abrasive undercar blasts.

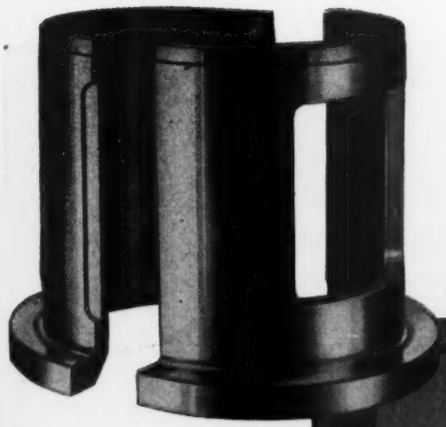
Like its super-thin companion "Scotch" 33, "Scotch" Electrical Tape No. 21 has a vinyl plastic backing that resists weathering and sunlight, acids, oils and alkalies. It's *dependable*, and it saves you money since it takes very little to do a big job.

This triple-thick tape is just one of a large family of "Scotch" Electrical Tapes. And there's one for practically every requirement.

For the *right* "Scotch" Electrical Tape for *your* job, write Minnesota Mining & Mfg. Co., Dept. RE-11, St. Paul 6, Minn. We'll tell you where to get it right away.

FOR NEAT SPLICES in tight places try "Scotch" Plastic Electrical Tape No. 33. New ¾-in. x 20-ft. "Job Size" rolls are packed 12 to a sturdy screw-top container that keeps out dust and dirt, prevents bruised rolls. Order today from your supplier! Be ready for speedy splicing.

The term "Scotch" and the plaid design are registered trademarks for the more than 200 pressure-sensitive adhesive tapes made in U.S.A. by Minnesota Mining & Mfg. Co., St. Paul 6, Minn., also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: 122 E. 42nd St., New York 17, N.Y. In Canada: London, Ont., Can.



Here's how MAGNUS builds EXTRA MILEAGE into Traction Motor Support Bearings

● **FINAL MICROMETER TESTING** under load means perfectly mated bearing halves—your assurance of better performance on the road with Magnus High Mileage bearings.

Putting cost-saving extra miles into precision bearings is a real art with Magnus. It means a lot of extra care in manufacture that really pays off in performance: Magnus Traction Motor Support Bearings are setting mileage records in Diesel locomotives the country over.

Here are just a few highlights of Magnus HIGH MILEAGE bearing production:

- **SATCO LINING METAL** gives greater resistance to wear and load — stronger bonds — increased hardness at high temperatures.
- **IMPROVED FLANGE FILLET PROFILE** prevents "riding" the fillet and "feathering" of the lining metal.
- **HI-STRENGTH BRASS BACKS,** made from high-tin, fine-grained wearing metal mixes that are *Magnus-guaranteed.*
- **COMMUTATOR-PINION END INTERCHANGEABILITY** — a Magnus-pioneered improvement that simplifies maintenance and saves in bearing stockpiling.

Magnus HIGH MILEAGE Traction Motor Support Bearings are available for replacement on every type and make of diesel-electric and electric locomotives, and "MU" cars. For complete information, send for your free copy of Bulletin No. 6000. Just write a post card or letter to Magnus Metal Corporation, 111 Broadway, New York 6, N.Y.; or, 80 E. Jackson Boulevard, Chicago 4, Ill.

MAGNUS

High Mileage

TRACTION MOTOR SUPPORT BEARINGS

...for every type and make of diesel locomotive

MAGNUS METAL CORPORATION *Subsidiary of* **NATIONAL LEAD COMPANY**

an ACCO product

DESIGNED FOR RAILROAD SHOPS

● ACCO *Registered* Wire Rope Slings are made as exact tools for shop operations on diesel engines, traction motors, generators, and trucks.

Sling RR-EE-5A (*illustrated*) was designed for handling all traction motors. It is highly efficient and provides safety for both men and equipment.

This sling, and many other ACCO *Registered* Slings designed specifically for railroad use, has a positive safety factor assured by: **1)** Definite warranted strength, **2)** Full compliance with ACCO *Registered* specifications, **3)** Proof-loading at two times rated capacity.

Write today for information on the complete line of ACCO *Registered* Wire Rope Slings for all railroad uses.

*Trade Mark Registered
Patent No. 2463199

ACCO Registered DUALOC Slings

ACCO

TRADE MARK

WIRE ROPE SLING DEPARTMENT
AMERICAN CHAIN & CABLE

Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

Eliminate journal lubrication between wheel-turnings!

Grease-lubricated TIMKEN® bearings go full wheel-turning period without attention!

FROM wheel-turning to wheel-turning, grease-lubricated Timken® bearings need no attention! Operating tests on passenger cars and diesels in regular service prove it! In fact, in one of these tests, grease-lubricated Timken bearings ran over 200,000 miles without adding any lubricant.

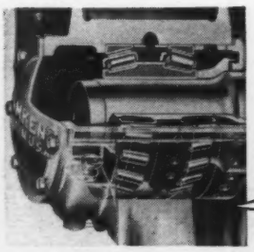
Wheel-turning to wheel-turning grease lubrication of Timken bearings will bring important new economies to the railroads. They'll eliminate man-hours previously needed for checking and addition of lubricant between wheel-turnings. And they'll save on lubricant itself.

Already three leading railroads have made the switch from oil to grease lubrication of their Timken bearing equipped passenger cars. And right now more than a dozen other railroads are testing wheel-turning to wheel-turning grease lubrication of their Timken bearings with favorable results.

Railroad operating tests show that Timken bearings are the *only* railroad journal bearings using an AAR-approved grease which consistently can go a full wheel-turning period without addition of lubricant. And Timken bearings can be converted from oil lubrication to grease without modifying the bearings or buying extra journal parts.

We'll be glad to help you investigate the cost-saving advantages of grease lubrication of Timken bearings on *your* railroad. Write The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS



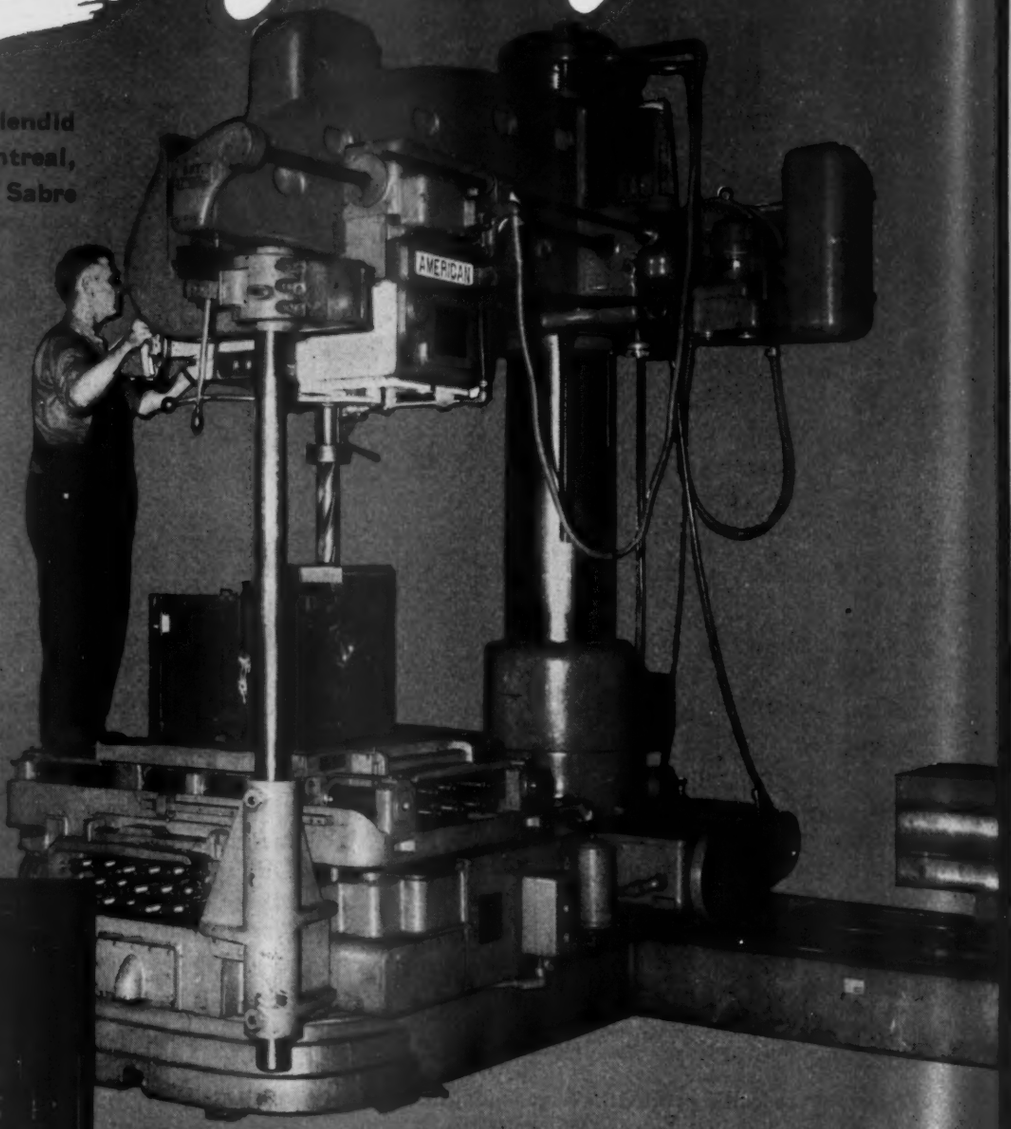
GREASE ME AT ONE WHEEL-TURNING ...FORGET ME 'TIL THE NEXT!

NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◎ AND THRUST ←◎→ LOADS OR ANY COMBINATION ✳

On TOP of his job!

This operator is doing a splendid job at Canadair Limited, Montreal, on the production of F-86E Sabre Jets for the RCAF and, as the illustration shows, he is right on top of his job, too.

He is proud of his fine new 6' 17" column "AMERICAN" Hole Wizard Radial. "It's powerful; it's sturdy; it's easy to operate, and I'm not worn out at the end of the day". What more could any operator ask? As a consequence he turns out a lot of fine work which makes his machine a paying investment for the company.



This *"American"* Hole Wizard Radial has a right angle base, on one wing of which is mounted a Bullard Man-Au-Trol Spacer—as shown by the illustration.

"AMERICAN" Hole Wizard Radials are playing a prominent part in the production of critical defense items for both the U. S. A. and Canada.

For a complete revelation of their virtues send for descriptive bulletin No. 327.

THE AMERICAN TOOL WORKS CO. Cincinnati 2, Ohio, U. S. A.

LATHES AND RADIAL DRILLS

Fire hazard eliminated—by proper cleaning!

There's more to cleaning running gear than meets the eye. For though every road takes pride in the appearance of its locomotives, it should be especially concerned with the very real danger of fire made possible by incomplete cleaning of running gear.

Hidden spots may be untouched during several cleanings. In time, these spots collect a thick layer of oily dirt. Just one red-hot spark from a brake shoe can set this "tinder" aflame. If there's a large oil tank nearby, the damage can run into thousands of dollars within seconds!

Railroaders can help eliminate this hazard by stressing *thorough* cleaning to workmen, and by using hard-working cleaning materials—the kind Pennsalt supplies to leading roads all over the nation.

For the most efficient spray cleaning of running gear, Pennsalt recommends Cleaner No. 77—a heavy-duty alkaline cleaner that removes thick soil of all types, then rinses free quickly. When running gear must be cleaned in a confined area, Pennsalt Cleaner EC-10 is the choice for efficient, safe removal of soil. It is a mild, non-caustic, solvent emulsion cleaner that also acts as a rust inhibitor on steel parts.

For more information on these outstanding cleaners, or for aid in setting up a safer, more effective running-gear cleaning program, send the coupon to: Maintenance Chemicals Department, **East:** Pennsylvania Salt Mfg. Co., Philadelphia 7, Pennsylvania **West:** Pennsylvania Salt Mfg. Co. of Washington, 2168 Shattuck Ave., Berkeley 4, California.

Pennsalt Chemicals

Send me information ☐ on these Pennsalt Cleaners ☐ on setting up a safer running-gear cleaning program.

Name_____

Company_____

Address_____

City_____

Built for RAILROAD use...

with railroad watch precision

"OXWELD" W-24-R RAILROAD BLOWPIPE

This is the only blowpipe made especially for the service of railroads—rugged, long-lasting, economical, easy to maintain. You can rely on the OXWELD W-24-R Blowpipe for long, dependable service under *any* operating condition. Its efficient design and high standard of workmanship is based on OXWELD's skill and practical experience gained by working exclusively with railroads.

Write to OXWELD or ask a representative for further details.

WIDEST WORK RANGE

17 welding heads available — to perform a complete range of manual welding and also heavy heating and flame-cleaning.

FOR MEDIUM- OR LOW-PRESSURE OPERATION

Injector principle means steady pressure, constant flame, quality welding results — with either medium- or low-pressure operation.

CHROMIUM PLATED WELDING HEADS

Plating eliminates weld metal sticking to tip and also reduces pick-up of radiated heat.

SEPARATE INJECTORS

Each welding head, with its own injector, assures stable, soft flame.

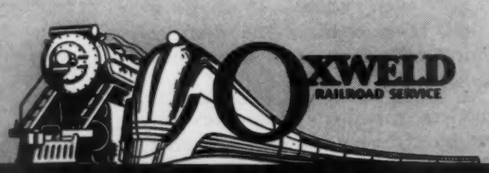
CUTTING ATTACHMENT AVAILABLE

Light plate as well as 5-in. thick steel can be flame-cut with the CW-24-R Cutting Attachment — flame-gouging nozzles fit attachment to speed repair work.

WELDING HEAD SIZE NUMBERS

Head numbers indicate oxygen and acetylene consumption in cubic feet per hour with neutral flame in use. Pick the head you want at a glance.

OXWELD RAILROAD SERVICE COMPANY
A Division of Union Carbide and Carbon Corporation
UCC
Carbide and Carbon Building Chicago and New York
In Canada:
Canadian Railroad Service Company, Limited, Toronto



SINCE 1912—THE COMPLETE OXY-ACETYLENE SERVICE FOR AMERICAN RAILROADS

The term "Oxweld" is a registered trade-mark of Union Carbide and Carbon Corporation.

why these long travel springs

ARE YOUR SHORTEST DISTANCE TO MORE PROFIT

Higher revenue because of lower damage claims is one of the major benefits you receive with the long travel springs made by the Railway Steel-Spring Division. These rugged, heavy duty coil springs neutralize the effects of heavy jars and shocks. Result: not only are damage claims fewer but wear and tear on the rolling stock and roadbed also are reduced, saving a considerable sum on maintenance costs.

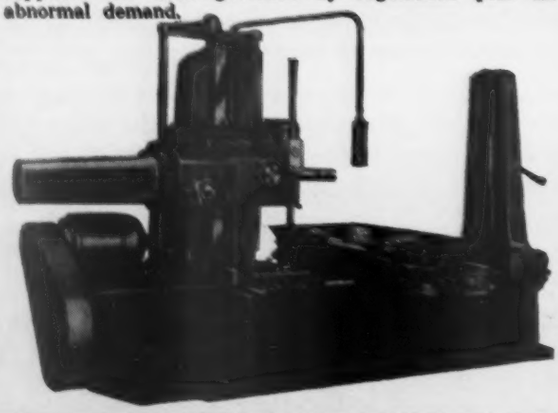
Such advantages are no accident; they are the result of the long experience of the Railway Steel-Spring Division, one of the oldest spring manufacturers in this country. For complete information, call your Alco sales representative in New York, Cleveland, Chicago, St. Louis, St. Paul, San Francisco.

Railway Steel-Spring Division

AMERICAN LOCOMOTIVE COMPANY

This is one of America's outstanding plants of its kind, and every tool in it is there for the production of Lucas Horizontal Boring, Drilling and Milling machines. This specialization means a greater output of critically needed machines for the defense program.

We still have to keep many a loyal customer waiting, because our output like that of all other defense machine suppliers has been governed by regulations plus an abnormal demand.



Your inquiry and your order are still as welcome as ever. When you do get the Lucas you need you'll find it your No. 1 money maker — the most used machine in the shop.

THE NEW BRITAIN MACHINE COMPANY LUCAS

LUCAS

Precision

HORIZONTAL BORING, DRILLING AND MILLING MACHINES
LUCAS MACHINE DIVISION, THE NEW BRITAIN MACHINE CO.
CLEVELAND 8, OHIO

"Tycol Adeltran Oils resist bearing corrosion... keep diesels operating at peak performance"

That's right! Tycol Adeltran Heavy Duty Lubricants meet every requirement of modern diesel engines.

They stand up to long hauls and heavy loads without gumming or ring sticking. High quality base stocks, fortified with selected additives, enable Adeltran to lengthen engine service life... assure cleaner engines... meet every type of operating condition.

Get in touch with your local Tide Water Associated office for further information.

SEND FOR A FREE COPY OF "TIDE WATER ASSOCIATED LUBRICANIA"

TYCOL

INDUSTRIAL LUBRICANTS

Boston • Charlotte, N. C. • Pittsburgh
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TIDE WATER ASSOCIATED OIL COMPANY

17 BATTERY PLACE · NEW YORK 4, N. Y.

BLUE STREAK
FAST FREIGHT
308

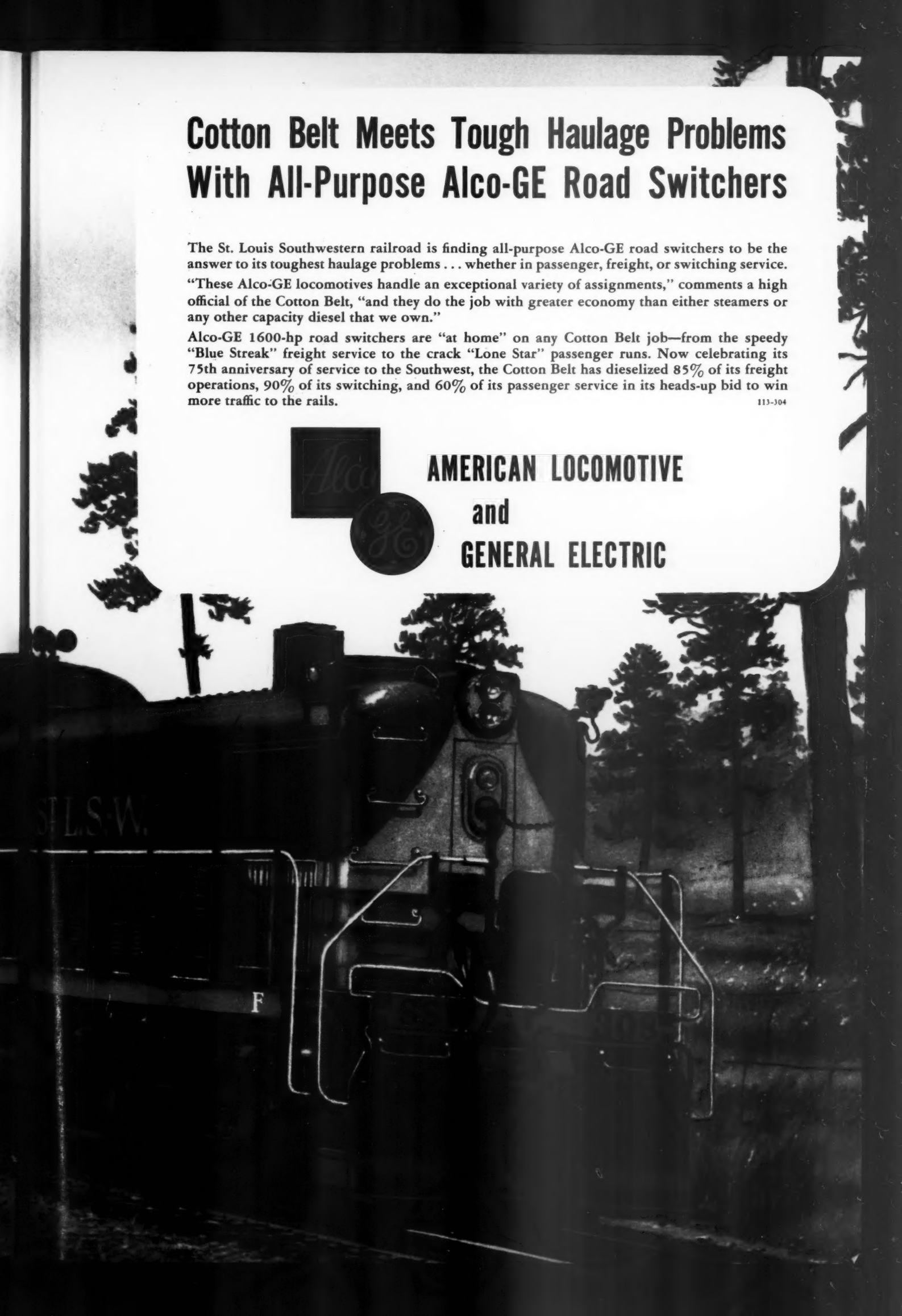
Cotton Belt Meets Tough Haulage Problems With All-Purpose Alco-GE Road Switchers

The St. Louis Southwestern railroad is finding all-purpose Alco-GE road switchers to be the answer to its toughest haulage problems . . . whether in passenger, freight, or switching service.

"These Alco-GE locomotives handle an exceptional variety of assignments," comments a high official of the Cotton Belt, "and they do the job with greater economy than either steamers or any other capacity diesel that we own."

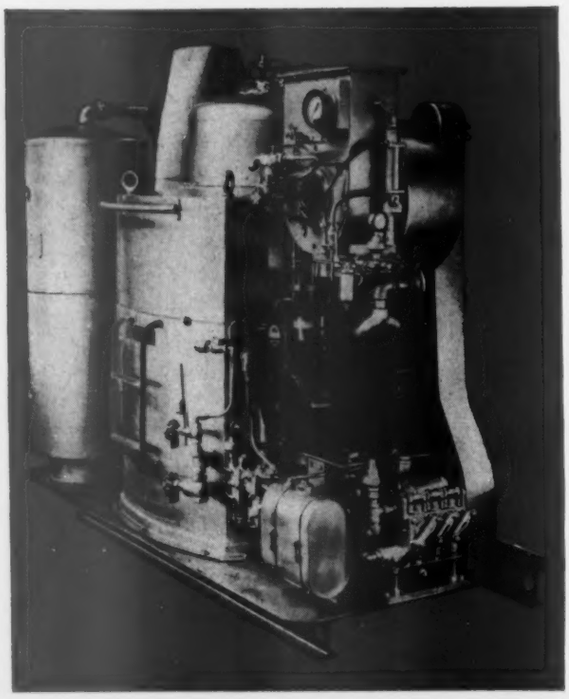
Alco-GE 1600-hp road switchers are "at home" on any Cotton Belt job—from the speedy "Blue Streak" freight service to the crack "Lone Star" passenger runs. Now celebrating its 75th anniversary of service to the Southwest, the Cotton Belt has dieselized 85% of its freight operations, 90% of its switching, and 60% of its passenger service in its heads-up bid to win more traffic to the rails.

113-304



USING 561 FEET OF NATIONAL SEAMLESS TUBES

Midget generator drives giant pile driver



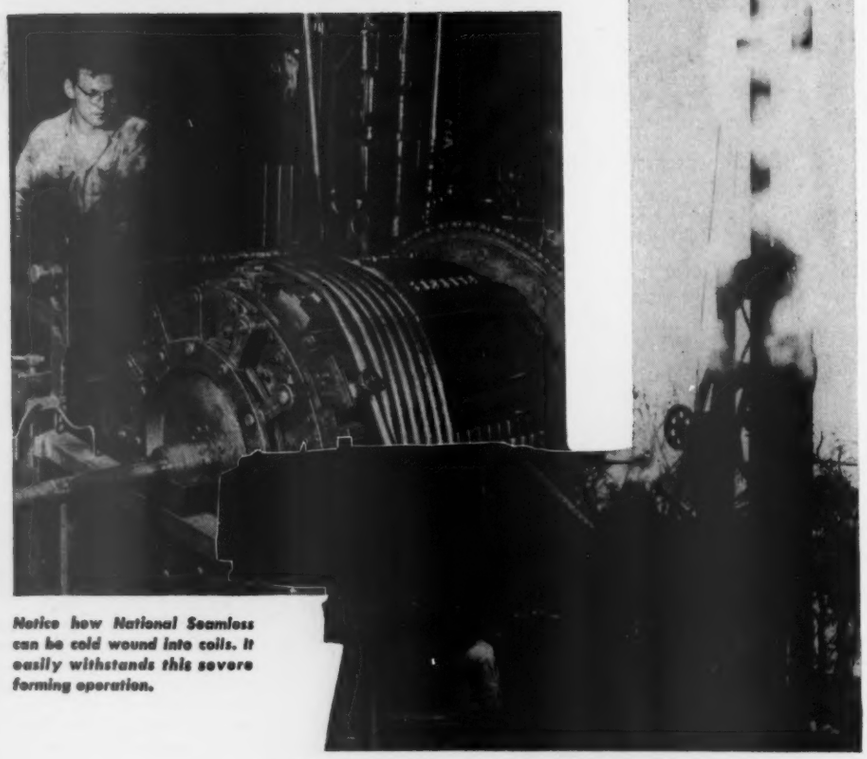
develops full pressure in just 2 minutes from a cold start

● This four-car railroad pile driving rig has a total weight of over *660,000* pounds.

On just 75 gallons of oil per day, the steam generator shown here* (similar to the type used to heat diesel powered passenger trains) will move the entire rig down the track at 15 to 20 miles per hour, drive the air brake compressor, operate the hammer continually and furnish steam for the hoist—all this in a generator you could put in an ordinary clothes closet!

For size and weight, this is the most powerful steam-making machine ever developed.

Heart of this generator is a set of National Seamless Steel Tube coils over 561 feet long. Standard lengths are welded into 200 or 300 foot lengths, then cold rolled into a coil that must withstand a 1200 psi hydrostatic pressure test.



Notice how National Seamless can be cold wound into coils. It easily withstands this severe forming operation.

The National Seamless Tubes do a fine job despite the severe fabrication method and rigorous tests. These tubes can take it, because there aren't any welds to weaken or injure the tube. Every tube is actually pierced from a solid billet of high quality steel — the *one* manufacturing method that removes all doubt concerning uniform wall strength.

When you plan to use tubes in the future, be sure to specify National Seamless. They are made by the world's largest, most experienced manufacturer of tubular steel products.

**Manufacturer's name on request.*

USS

NATIONAL TUBE DIVISION, UNITED STATES STEEL COMPANY, PITTSBURGH, PA.
(TUBING SPECIALTIES)

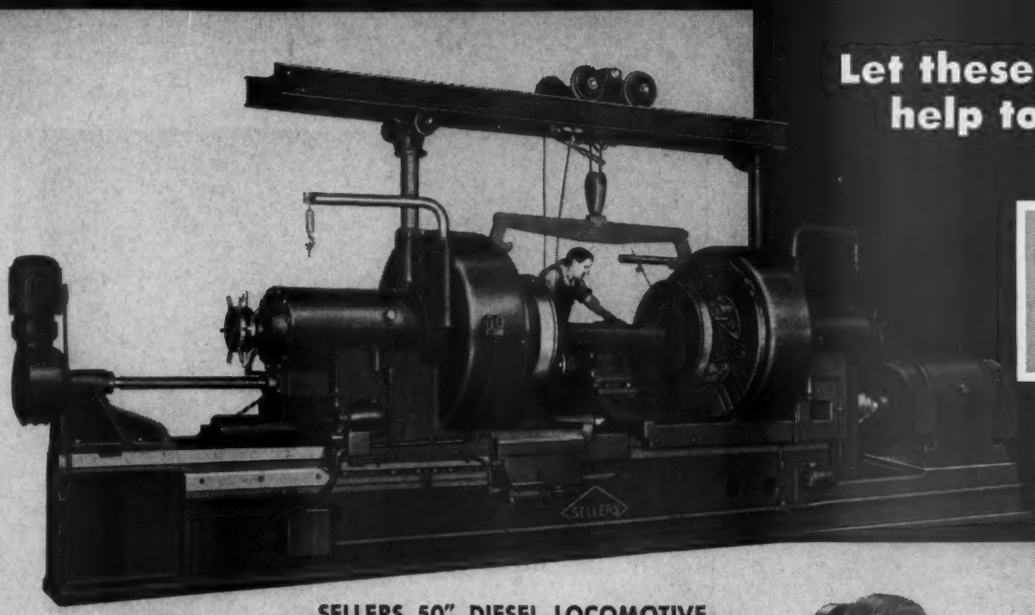
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S NATIONAL *Seamless* TUBES

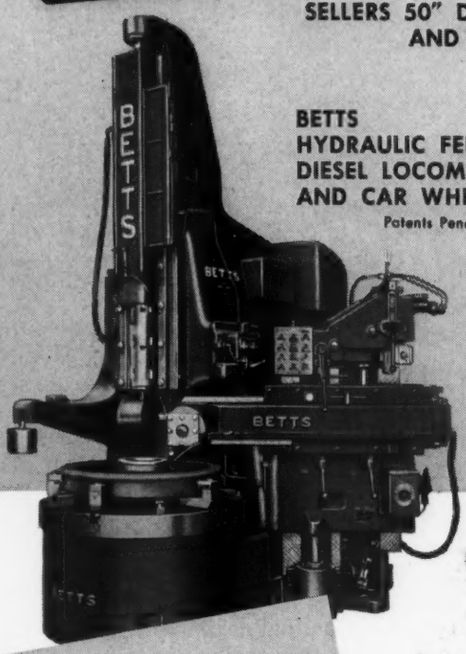
UNITED STATES STEEL

Let these modern machines help to reduce your costs

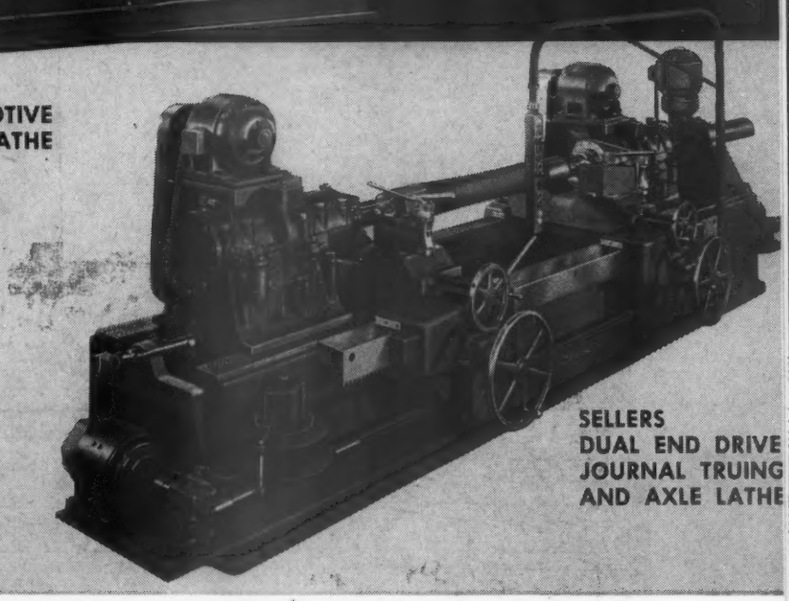
Faster, more economical production for all your diesel locomotive and car wheel and axle work



SELLERS 50" DIESEL LOCOMOTIVE AND CAR WHEEL LATHE



BETTS
HYDRAULIC FEED
DIESEL LOCOMOTIVE
AND CAR WHEEL BORER
Patents Pending



SELLERS
DUAL END DRIVE
JOURNAL TRUING
AND AXLE LATHE

Among Railroad Tools built by Consolidated are . . .

CAR WHEEL BORERS
DIESEL WHEEL BORERS
BURNISHING LATHES
TIRE MILLS
END DRIVE AXLE LATHES
CENTER DRIVE AXLE LATHES
JOURNAL TRUING LATHES
DRIVING WHEEL LATHES
CAR WHEEL LATHES
RADIUS LINK GRINDERS
PROFILE MILLING MACHINES
SLAB MILLING MACHINES
ROD MILLING MACHINES
CYLINDER BORING MACHINES
KEYWAY MILLING MACHINES
CRANK PLANERS
DRILL PRESSES
AND OTHERS

SELLERS 50" DIESEL LOCOMOTIVE AND CAR WHEEL LATHE turns diesel locomotive and car wheels from 28" to 50" tread diameter. Designed with speed range suitable for either carbide or high speed steel tools. Two mechanical speed changes in conjunction with a variable speed 75 H.P. motor provide speed ranges of approximately .9 to 3.6 R.P.M. and 5 to 20 R.P.M. of faceplate with instantaneous speed selection. Faceplates are recessed, with removable filler blocks, for turning diesel wheels, motor coach wheels and trailer wheels with roller bearings. As illustrated, this machine is arranged with four self-equalizing hydraulic drivers on each faceplate, insuring equalized pressure on the wheel rims.

BETTS HYDRAULIC FEED DIESEL LOCOMOTIVE AND CAR WHEEL BORER takes diesel locomotive wheels up to 48" tread diameter, passenger and freight car wheels down to 30" tread diameter. Hydraulically operated side head, for turning and facing hubs, has feed and rapid traverse vertically and horizontally with supplementary hand feed. Full automatic boring cycle from loaded start to stop supplemented by manual operation at any point in the automatic cycle. Speed range suitable for either carbide or high speed steel tools.

SELLERS DUAL END DRIVE JOURNAL TRUING AND AXLE LATHE for both new and reconditioning work, this machine turns and burnishes rough turned AAR car axles in sizes from 4¼" x 8" up to and including 6½" x 12", and turns and burnishes journals and collars on mounted car wheel sets up to and including 38" tread diameter. It is also available with greater swing for larger wheels. Designed with speed range suitable for carbide tools.

Full details covering any or all of these modern Consolidated machines will be furnished upon request. Let us show you how their labor-saving features not only can help to reduce your costs but also, by largely eliminating manual operations, encourage the operator to make full use of the higher production capacities of which these machines are capable.

BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1848

BETTS • BETTS-BRIDGEFORD • COLBURN • HILLES & JONES • MODERN • NEWTON • SELLERS

CONSOLIDATED MACHINE TOOLS

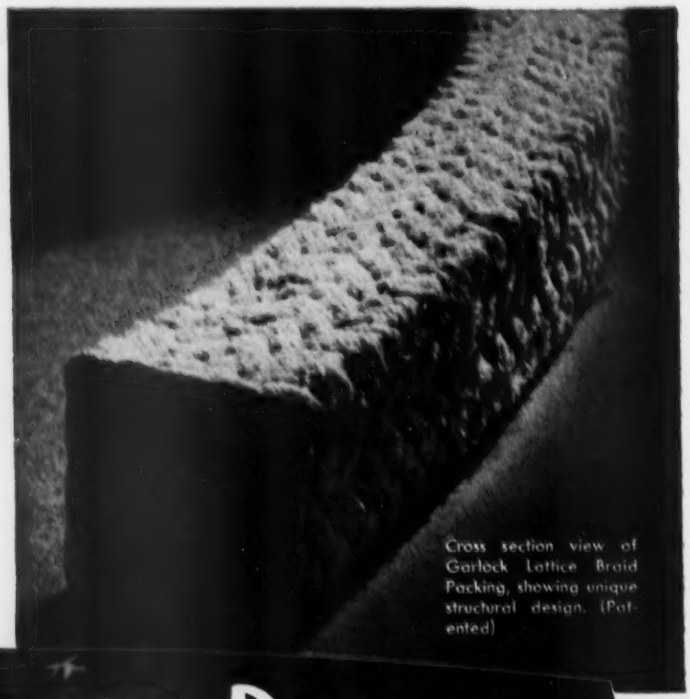
CONSOLIDATED
MACHINE TOOL CORPORATION

SUBSIDIARY OF FARREL-BIRMINGHAM COMPANY, INCORPORATED

At

Diesel Fueling Stations

USE



Cross section view of Garlock Lattice Braid Packing, showing unique structural design. (Patented)

LATTICE-BRAID PACKING

Garlock 733 (asbestos) LATTICE-BRAID Packing

Garlock's specially designed machines for making LATTICE-BRAID Packing

TROUBLE-FREE and LONG-LASTING ON ROTARY FUEL PUMPS

The strands of Garlock Lattice-Braid packings are braided through and through linking them together into a single unit. This patented braiding process provides unusual flexibility and semi-automatic pressure action which keeps the packing properly adjusted in the stuffing box.

The flexible and pressure-responsive features of Lattice-Braid packings mean longer service with less attention. These are the reasons why Lattice-Braid packings are extensively used on rotary fuel pumps in diesel fueling stations. If you are not using Lattice-Braid packings write today for folder AD-131.

Lattice-Braid packing is manufactured from flax, cotton, asbestos, wire-inserted asbestos and "TEFLON"—for various types of service. Furnished in ring or coil form. Only Garlock makes Lattice-Braid packing.

THE GARLOCK PACKING COMPANY
PALMYRA, NEW YORK

In Canada: The Garlock Packing Company of Canada Ltd., Toronto, Ont.

GARLOCK

PACKINGS, GASKETS, OIL SEALS, MECHANICAL SEALS, RUBBER EXPANSION JOINTS

One of the first railroads to adopt air-conditioning of passenger-train cars obtained 15 years of service from its first EDISON batteries applied to cars equipped with electro-mechanical air-conditioning. These same batteries were then applied to head-end cars where they are in operation now.

An analysis of the EDISON batteries in operation by another railroad, as of the end of a recent twelve month period, showed that the average age of all cells of all batteries replaced during the year was 18.04 years and that the age of the oldest battery in operation was 35 years. These figures cover all batteries in operation on passenger-train cars both with and without air-conditioning.*

...life records like these are further evidence that EDISON batteries

cost less per year

in passenger-train-car service

EDISON
Nickel • Iron • Alkaline
STORAGE BATTERIES
Edison Storage Battery Division of
Thomas A. Edison, Incorporated, West Orange, N. J.

ENTERPRISE
UNIT DOOR LATCH
For Hopper Cars

OVER 320,000 HOPPERS
Now Equipped with
ENTERPRISE UNIT DOOR LATCH

Door Operating Devices Exclusively Since 1903

ENTERPRISE RAILWAY EQUIPMENT COMPANY

[illegible] East Van Buren Street - Chicago 5, Illinois

BROWNHOIST

BUILDS BETTER BULK MATERIALS HANDLING EQUIPMENT

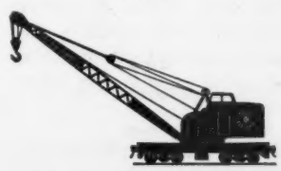
For over three quarters of a century Brownhoist has engineered, designed and built boat unloaders, storage bridges, cranes and car dumpers for efficient handling of coal, ore and other bulk materials in practically every corner of the world.

Railroads, steel mills and dock operators interested in machinery for handling ore, coal or other bulk materials will find that it pays to discuss their requirements with Brownhoist engineers.

Brownhoist equipment includes unloaders, fast plants, traveling bridge cranes, Diesel and Diesel Electric locomotive cranes, clamshell buckets, car dumpers, car pushers, shipyard cranes, and related machinery.

BROWNHOIST BUILDS BETTER CRANES

160

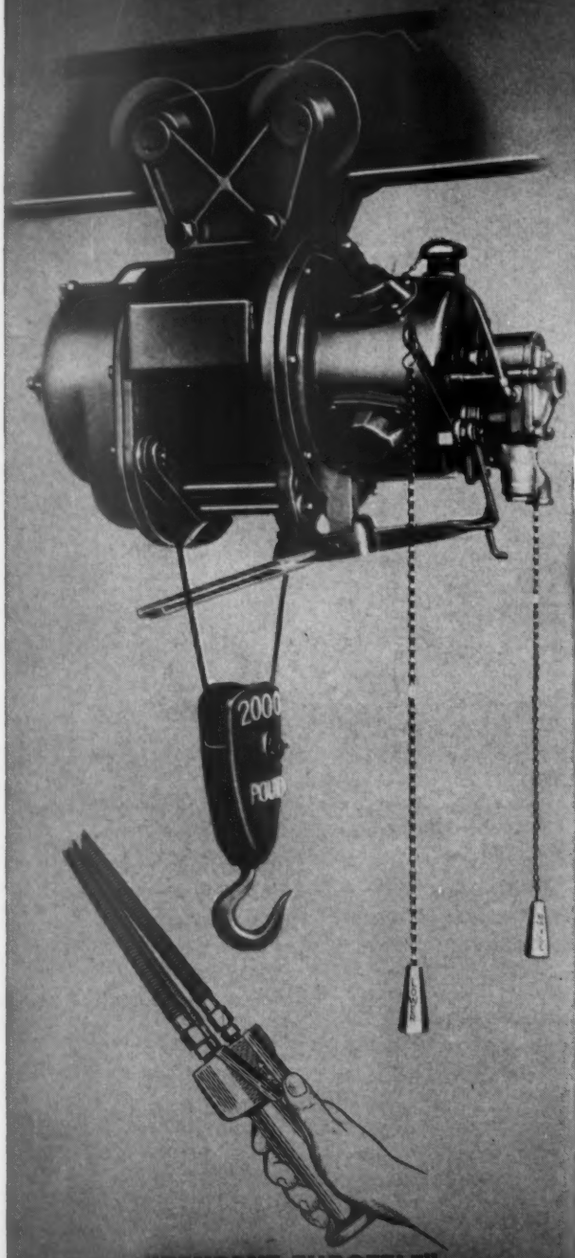


INDUSTRIAL BROWNHOIST CORPORATION
BAY CITY, MICHIGAN

DISTRICT OFFICES: New York, Philadelphia, Cleveland, San Francisco, Chicago, Canadian Brownhoist, Ltd., Montreal, Quebec • **AGENCIES:** Detroit, Birmingham, Houston, Los Angeles

WHY PRODUCTION MEN

Choose AIR HOISTS



"PENDENT THROTTLE"

ANOTHER FIRST

HEAT—DAMPNESS—DIRT—WON'T HURT AIR HOISTS

Operating without the use of surrounding air for cooling, Ingersoll-Rand Air Hoists utilize internal pressure to keep out wet, hot, explosive or dirty atmospheres. They can be relied on for continuous operation with the minimum of maintenance. All moving parts are automatically lubricated.

COMPLETELY SAFE—LOAD CAN'T DROP

The Automatic Brake releases with air pressure only when the throttle is opened; therefore, even if the air supply should fail, the load cannot drop. The Automatic Safety Up- and Down-Stops prevent overrunning in both directions.

LIFT CONTROL FROM A SLOW CREEP TO TOP SPEED

The graduated Reverse Valve gives the operator complete control and permits accurate and easy spotting of the load. A Poppet-type Throttle prevents wasteful air leakage.

MORE HORSEPOWER PER POUND OF WEIGHT

Pound for pound Air Motors have more horsepower. There are eighteen standard sizes of Ingersoll-Rand Air Hoists, all having low air consumption, with capacities up to 20,000 pounds.

RUGGED CONSTRUCTION KEEPS THEM ON THE JOB

The time proven 4 cylinder, radial Air Motor features ball bearing support throughout, anti-friction bearings in the top hook and hook block, a groove type rope drum and a planetary gear system. All contribute to Ingersoll-Rand's reputation for dependability—many Hoists are still on the job after 20 years or more.

For special applications Ingersoll-Rand builds long-lift, low-head room and high capacity hoists. Let our application engineers make their recommendations without obligation to you.

801-B

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y.

COMPRESSORS • AIR TOOLS • ROCK DRILLS • TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • DIESEL AND GAS ENGINES

A fast accurate producer on a variety of

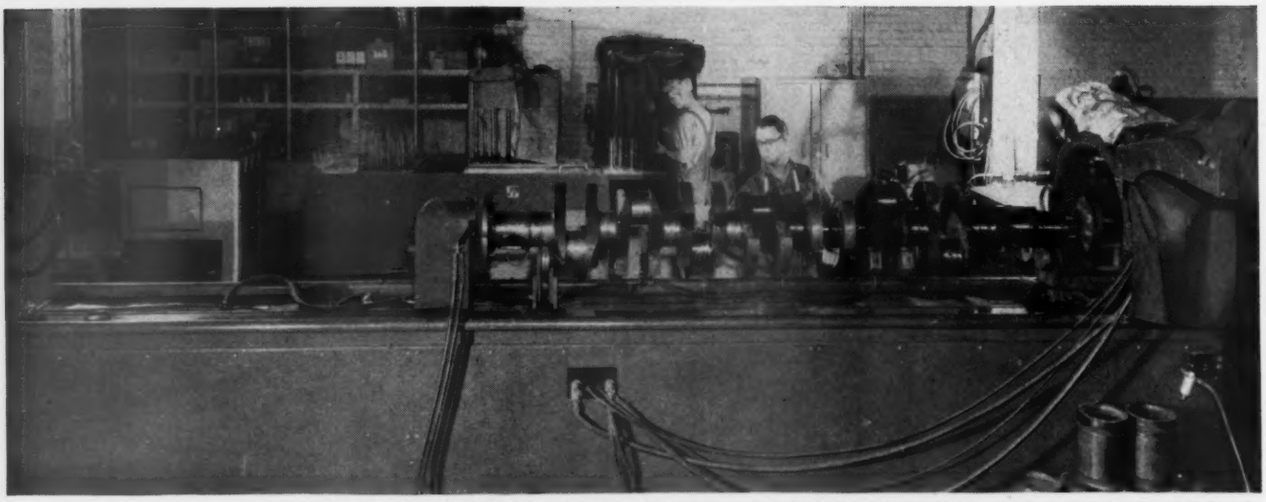
Here is a case in point. A prominent midwestern road with a high complement of Diesels keeps the 54-in. Bullard Cut Master illustrated busy with a variety of Diesel work. Shown is a typical job — boring a freight Diesel generator bell housing for a bushing. Other operations on this particular job include boring the bushing, pressing the bushing in the housing and finally boring the bushing to fit a roller bearing.

This versatile, fast-moving Cut Master with its wide range of speeds and feeds, is also utilized in this modern shop for boring gears for Diesel power wheels and for boring Diesel wheels.

BULLARD

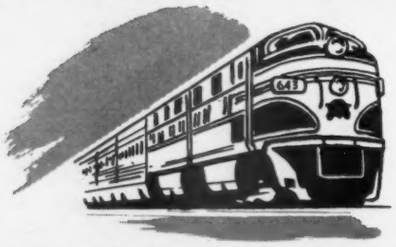
Wherever the Cut Master is used it gives shop schedules a big lift — keeping costs down and providing economical, top-level performance for the big production job or the less-frequent but equally important miscellaneous runs.

THE BULLARD COMPANY



Applying MAGNAGLO bath to Diesel crankshaft at the Silvis, Illinois, shops of the Rock Island. Magnetic particle inspection under black light will reveal any defects as a glowing, easily interpreted indication. In the background is the ZYGLO inspection unit.

Keeping the Rockets Rolling



...without failure and at lower shop costs

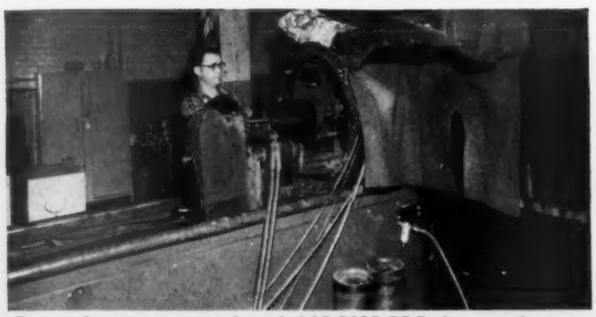
On the Rock Island, inspection with* MAGNAGLO *and* ZYGLO *is saving time and money for the railroad and helping to give its patrons the fast, dependable service for which the "Route of the Rockets" is famous.

Whenever a Diesel comes in for its 1,000,000 mile overhaul, pistons, piston carriers, cylinder heads, crankshaft, basket, valves and valve springs are inspected by MAGNAGLO or ZYGLO.

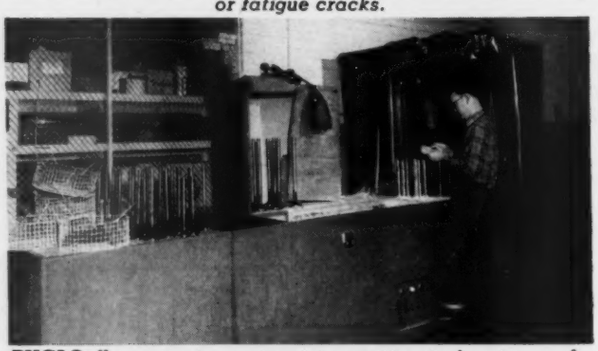
This inspection has reduced materially the overall load of the shop department. There are fewer emergency repairs to be made. Almost never is an engine "chewed up" by a part that has broken or comes loose in service. Simple road failures, costly to the railroad and its users, are practically unknown.

MAGNAGLO and ZYGLO have smoothed out procedures in the shop, too. Defective parts, shown by inspection, to be capable of safe salvage, are reconditioned *on a convenient schedule* and become part of a revolving pool for use in other overhaul work.

What these MAGNAFLUX inspection methods are doing on the Rock Island is typical of the savings and improvements they have accomplished for dozens of other progressive railroads. Write today and we'll send you bulletins and reports *promptly*.



Piston being inspected with MAGNAGLO for overheating or fatigue cracks.



ZYGLO fluorescent penetrant inspection to locate cracks in exhaust valves.

MAGNAFLUX

DETECTS DEFECTS

MAGNAFLUX CORPORATION
5920 Northwest Highway, Chicago 31, Illinois

Reg. U. S. Pat. Off.

New York 18 • Cleveland 15 • Detroit 11 • Dallas 9 • Los Angeles 58
Export Distributor: Curtis Wright Corp.
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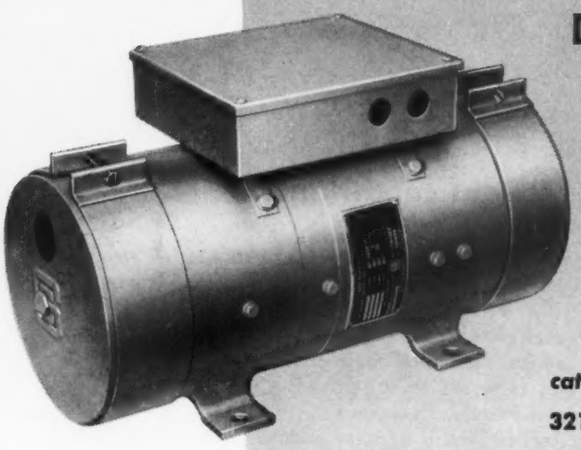
"SAFETY" Conversion Equipment...

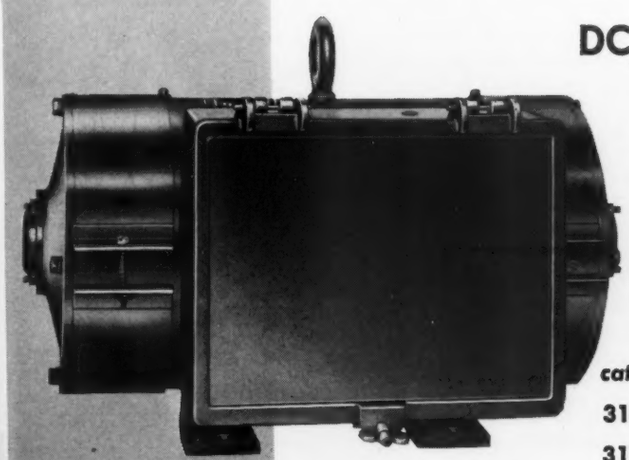


DC to DC...

"Safety" Motor Generators **... for DC to DC power conversion ... signaling and battery charging applications ... close inherent output voltage regulation regardless of input voltage variations.**

cat. no.	*watts*	*dc input*	*dc output*	*rpm*
321258	200	64 volts	32 volts	2500
320560	200	32 volts	6.8 volts	2500

Motor Generator Units of 300, 1200 and 1500 watts are also available.



DC to AC...

"Safety" Motor Alternators **... for DC to AC power conversion ... inherent frequency and voltage regulation ... used wherever single phase, 60 cycle AC output, is required for communication equipment.**

cat. no.	*watts*	*dc input*	*ac output*	*rpm*
314132	300	32 volts	115 volts	1800
314131	300	64 volts	115 volts	1800
314190	300	115 volts	115 volts	1800

Motor Alternators of 1.2 KW, 2 KW, 3 KW and 7 KW capacities are also available.

Please contact our nearest Safety Company office for further information concerning this equipment.

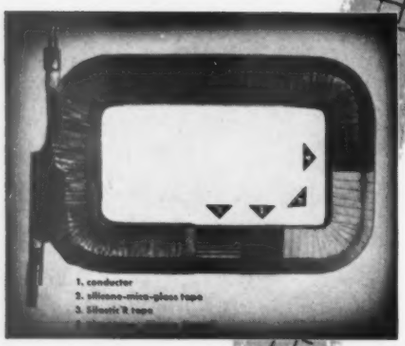
THE SAFETY CAR HEATING AND LIGHTING COMPANY INC.

NEW YORK · CHICAGO · PHILADELPHIA · ST. LOUIS · SAN FRANCISCO · NEW HAVEN · MONTREAL

SAFETY COMPANY PRODUCTS INCLUDE: Air-conditioning Equipment • Genemotors • Generators • Fans • Regulators • Lighting Fixtures • Switchboards • Parcel Racks • Motor Alternators • Dynamotors • Motor Generators • Dual Voltage MG Sets

after 1,253,781 miles of service,

traction motor field coils insulated with SILASTIC* R TAPE *still* in excellent condition!



Over 3 years ago one of our leading western railroads started to use Silastic R Tape as an insulating material for main and interpole field coils in traction motors. Recently inspected after 1,253,781 miles of passenger service, the first of these coils were just as resilient as ever; still tight on the pole pieces; still megged infinity. They were reinstalled for freight service where another million miles of trouble-free operation is expected.

That certainly confirms the judgement of the engineers who authorized a program for rewinding all burned out coils with Silastic R Tape. To date over 5100 such coils have been installed without a single failure.

That's why we say Silastic R Tape is the best insulating material for field coils in traction motors where high operating temperatures, moisture and vibration shorten the life of any resin bonded insulating materials. Reinforced with glass cloth and coated with a special semi-vulcanized Silastic stock, Silastic R Tape is easily applied and cured to form a void-free and resilient jacket. This insulating jacket has maximum resistance to heat, moisture, oil and vibration, and to both electrical and mechanical fatigue.

And field coils insulated with Silastic R Tape will withstand long and continuous exposure to Class H temperatures of 180°C. Exceptionally high thermal conductivity enables Silastic insulated coils to carry about 20% more load and still operate at the same temperature as comparable resin bonded, mica-glass insulated coils. That gives you still more overload protection and reliability.

What's more, you secure these advantages at a cost that's comparable to that of the best Class B coils!

*T. M. Reg. U. S. Pat. Off.

Reduce your maintenance and operating costs. Write for complete technical data on Silastic R Tape, code number S-23.

DOW CORNING CORPORATION

Midland, Michigan

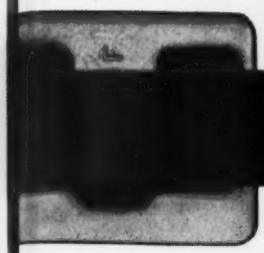
ATLANTA • CHICAGO • CLEVELAND • DALLAS • NEW YORK • LOS ANGELES • WASHINGTON, D.C.

In Canada: Fiberglas Canada Ltd., Toronto • Midland Silicones Ltd., London

FIRST IN SILICONES

DOW CORNING CORPORATION

lading strap anchor

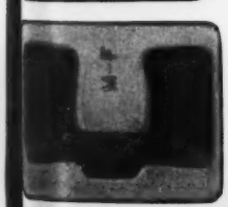


Here's real lading protection!

✓CUT CLAIMS

✓SATISFY SHIPPERS!

✓PROTECT SIDE LINING!



Easily and quickly applied to new or existing cars, the new *M-F lading strap anchor* is the final solution to proper loading! It *will not* allow the strap to slip off; it accommodates all popular sizes of strapping and is *easily* applied by the most inexperienced employee. Quickly and easily removed *without tools*, this unique, self-cleaning anchor makes proper loading technique *almost automatic!*

Two types available. The blind fastener (above) and the weld type (below). Both are quickly *and easily* attached to the "Z" bar side post of new or old cars! *In your constant program to cut claims, you stress proper loading techniques and careful handling . . . but don't forget to start at the beginning—with proper equipment!*

ENTS PENDING

MF M F

Wheels Go

IN...OFF...ON...OUT...FASTER

...with W-S High-Speed Straight-Through Mounting and Demounting Presses

Watson-Stillman High-Speed Production Mounting and Demounting Presses are literally the beginning and the end of modern wheel-shop practice. The entire line of wheel production and maintenance equipment waits upon the speed and efficiency with which wheels can be demounted, reconditioned and mounted.

This Year's Wheel Shop Committee report to the Car Department Officers' Association in Chicago is an admirable summary of needed revisions of existing wheel-shop equipment and practices. In it, the demand for faster, more economical mounting and demounting units shares significant mention along with faster machine tools and carbide tooling. Such modernization will, the committee feels, rapidly justify the investment through substantial savings in man-hours and idle machine time . . . while effecting an immediate improvement in the services of supply.

Whether you operate maintenance facilities on a centralized basis, or must continue to observe decentralization of repairs, W-S offers mounting and demounting equipment to satisfy the demands of your volume and operating budget. Our engineers will be glad to discuss your requirements at any time . . . with the sole obligation being our own—to help you solve equipment problems of any nature involving the extensive W-S All-Hydraulic line of production and maintenance units.

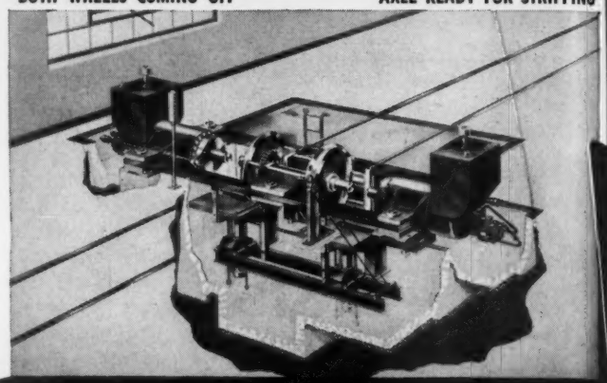
Why not write today for details and literature on these machines . . . then make a date for us to call at your convenience.

LEFT HAND WHEEL COMING OFF

RIGHT HAND WHEEL COMING OFF

BOTH WHEELS COMING OFF

AXLE READY FOR STRIPPING



WATSON-STILLMAN 300 TON STRAIGHT-THROUGH WHEEL MOUNTING PRESS

ROLLING WHEEL SET INTO PRESS

PREPARING GAUGE FOR RIGHT HAND WHEEL MOUNTING

OPERATOR HOLDING GAUGE USES FOOT TO PRESS RIGHT

OPERATOR OBSERVES GAUGE WHILE MACHINE DRIVES WHEEL

HYDRAULIC MACHINERY DIVISION

WATSON-STILLMAN

ESTABLISHED 1848

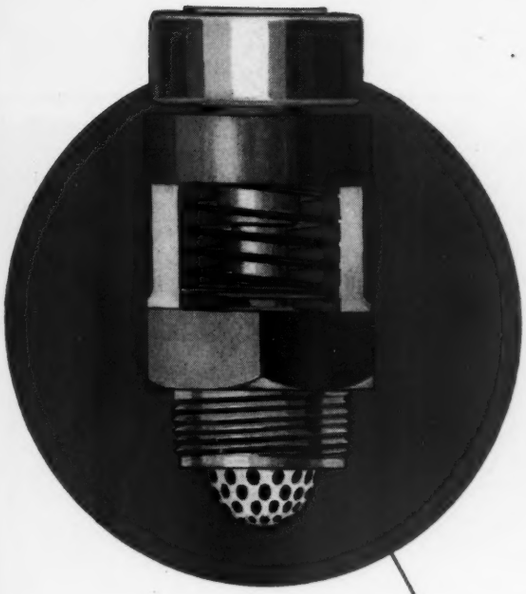
Factory and Main Office: 180 Aldene Road, ROSELLE, NEW JERSEY

Branch Office: CHICAGO, ILL.

Manufactured in Canada by CANADIAN VICKERS, Ltd., MONTREAL

REPRESENTATIVES

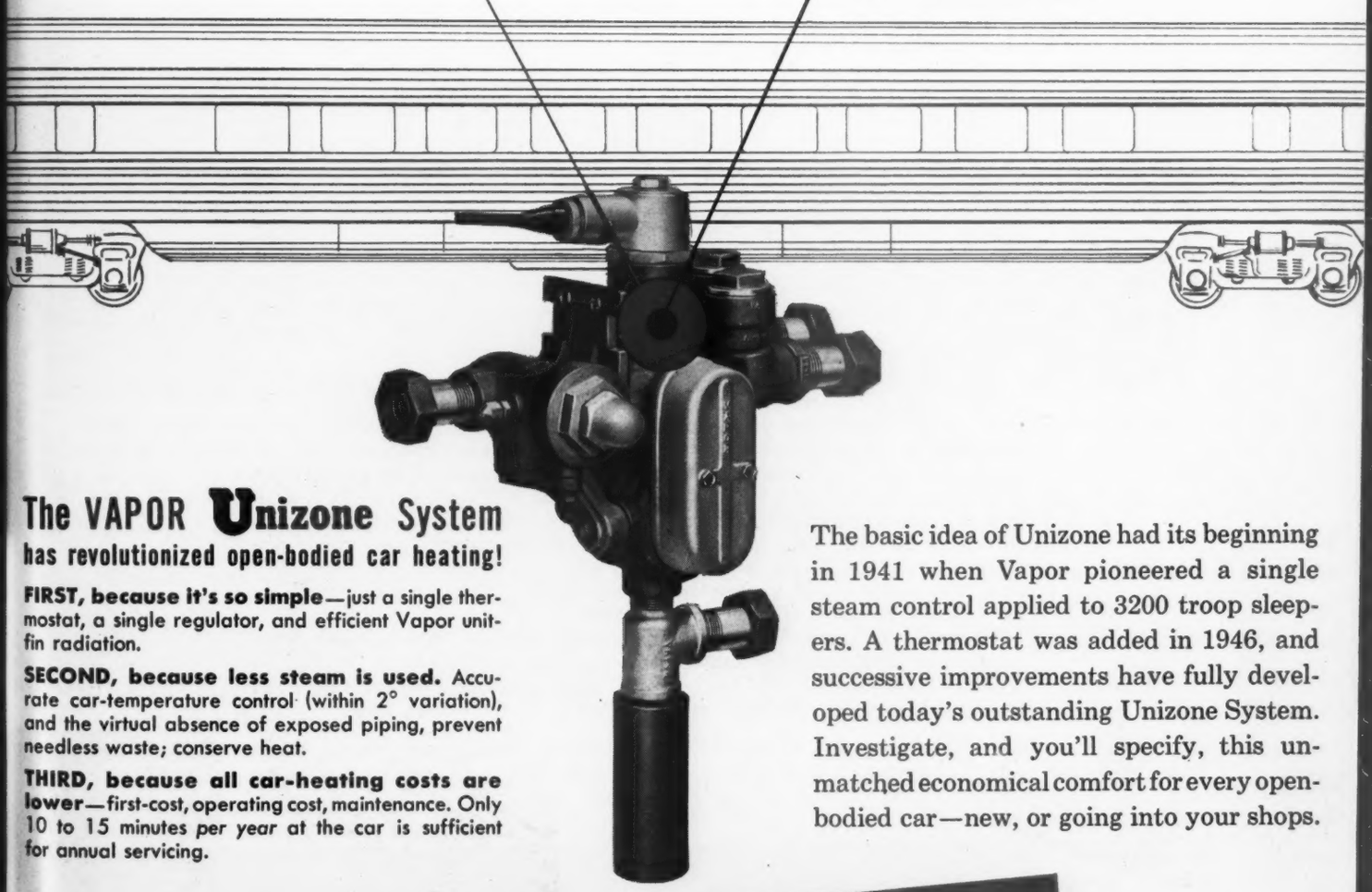
Chicago 4, Ill.....W. R. Walsh
Denver 2, Colo.....Overgard Machine Tool Co.
St. Paul 4, Minn.....Anderson Machine Tool Co.
San Francisco 5, Calif.....Overland Supply Co.



Part No. 1752-CC
(FULL SIZE)

THIS SINGLE UNIT
IS THE ONLY OPERATING PART
IN THE ENTIRE
VAPOR
Unizone System
FOR HEATING
OPEN-BODIED CARS*

*Coaches, Parlor Cars, Diners, etc.



The VAPOR Unizone System
has revolutionized open-bodied car heating!

FIRST, because it's so simple—just a single thermostat, a single regulator, and efficient Vapor unit-fin radiation.

SECOND, because less steam is used. Accurate car-temperature control (within 2° variation), and the virtual absence of exposed piping, prevent needless waste; conserve heat.

THIRD, because all car-heating costs are lower—first-cost, operating cost, maintenance. Only 10 to 15 minutes *per year* at the car is sufficient for annual servicing.

The basic idea of Unizone had its beginning in 1941 when Vapor pioneered a single steam control applied to 3200 troop sleepers. A thermostat was added in 1946, and successive improvements have fully developed today's outstanding Unizone System. Investigate, and you'll specify, this unmatched economical comfort for every open-bodied car—new, or going into your shops.

VAPOR HEATING CORPORATION

80 EAST JACKSON BLVD., CHICAGO 4, ILLINOIS

NEW YORK • ST. PAUL • DENVER • ST. LOUIS • PORTLAND • WASHINGTON • PHILADELPHIA
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Personnel Relations

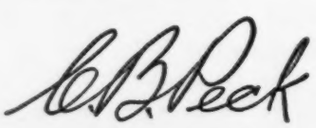
"Public relations" and "employee relations" are two subjects which have been under discussion intermittently for many years. The tenor of the discussions has largely been such that the terms have come to stand for highly specialized subjects with which no one but experts are competent to deal. "Public-relations" or "employee-relations" programs implied projects formulated by specialists and consisting largely of advertisements and releases with which the general run of railway supervisors and officials had little responsibility.

It is encouraging to note evidences of a growing realization that public relations and employee relations are not unrelated subjects but are merely two aspects of a single subject—human relations.

This was stated clearly by L. C. Porter, vice-president of the Texas & Pacific, in his address before the September annual meeting of the Railway Fuel and Traveling Engineers' Association at Chicago. Mr. Porter, who was responsible for preparing the general outline of a public and employee relations program for his railroad, brought these subjects down from the rarefied realm of the specialist to the level of railroad men in the ranks, as well as supervisors and officers, by his definition of public relations—"The word 'public' means people," said he. "The word 'relations' has a number of meanings, but for the purpose of the definition, 'association, connection, or dealing with' is sufficient. Thus 'public relations' actually means association, connection, or dealings with people." Public relations and employee relations come down to a matter of the attitude of individuals in dealing with each other.

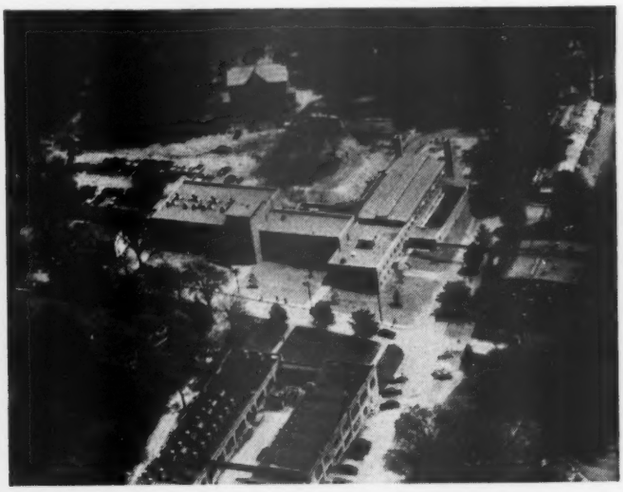
No program confined to propaganda of any kind ever gets to the heart of the matter. Good public relations can be obtained only when good employee relations prevail. Good employee relations are a matter of attitude in which representatives of the employer express—one might even say radiate—a spirit of good will toward employees. Until such an attitude is expressed by an employer and his representatives, it will not be reciprocated by the employees. The dealings of a railroad with the public are the dealings of individual employees with individual people. These relationships can be satisfactory only when the attitude of the employees is one of good will toward those with whom they deal. This attitude will not prevail unless a feeling of good will prevails in the relations between employer and employee.

The entire structure of satisfactory human relations, which incorporates satisfactory public relations and satisfactory employee relations, is founded on a simple basic principle. "It has been said that the first and best rule for good public and employee relations," said Mr. Porter, "is the Golden Rule."

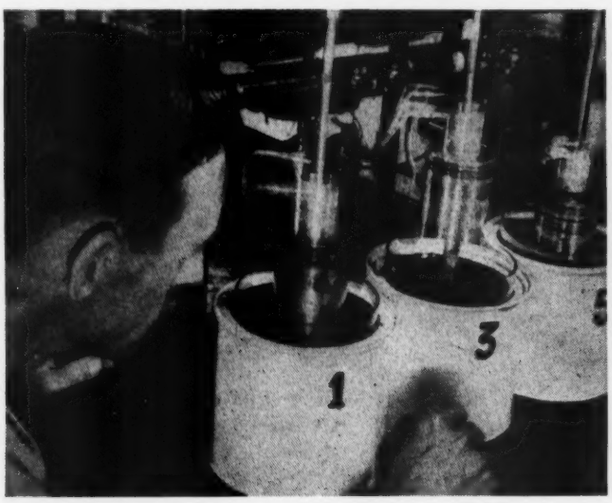


WHY TEXACO DIESEL LUBRICATING OILS

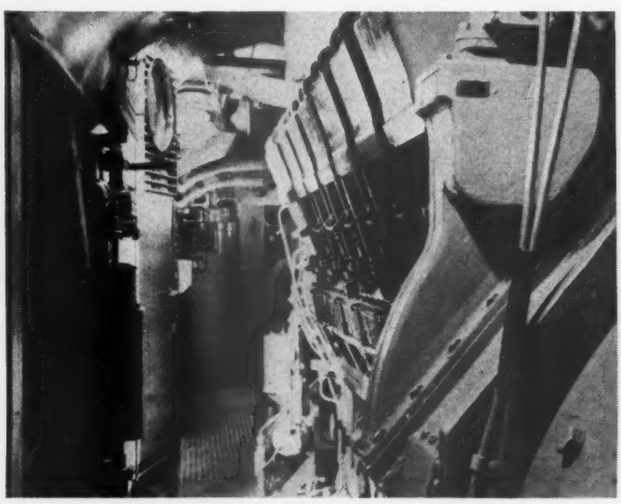
TEXACO LUBRICATION ENGINEERS — experienced railroad men — study lubrication problems at first hand.



RESEARCH SCIENTISTS in The Texas Company's Beacon Laboratories develop lubricants to meet specific needs.



BENCH TESTING speeds selection of best formulas which are then engine-tested by runs in full-scale laboratory and road Diesels.



FINAL TESTING is done in actual road service, under the exacting conditions of every type of operation.

RATE "FIRST WITH THE RAILROADS"

Skillful research, painstaking testing and extreme care in manufacture — these build the quality for which Texaco is famous. In conjunction with Texaco Systematic Engineering Service they have won for Texaco this first place with the railroads —

More railroad Diesel locomotives in the U.S. are lubricated with Texaco than with any other brand.

Enjoy the benefits of this unbeatable combination. Just call the nearest Railway Sales Office in New York, Chicago, San Francisco, St. Paul, St. Louis or Atlanta; or write:

☆ ☆ ☆

The Texas Company, *Railway Sales Department,* 135 East 42nd Street, New York 17, New York.

TEXACO Railroad Lubricants

AND SYSTEMATIC ENGINEERING SERVICE

Faithfully yours 50 *for Fifty Years*

TUNE IN: Tuesday nights on television—the TEXACO STAR THEATER starring MILTON BERLE. See newspaper for time and station.

you move the biggest pay loads with LOW-COST SOLID BEARINGS

At sub-zero temperature, solid bearings require up to 33% less power to overcome journal resistance over a whole run!

COLD WINTER weather is really rough on railroads. There's air-line leakage and icy rails—plenty of other power-demanding, power-reducing things to contend with. No wonder train loads are often cut!

But this is the time when the lower running resistance of standard solid bearings on freight car journals really pays off. At sub-zero temperatures, these low-cost bearings actually take up to 33⅓% less power to operate over a given run than is required for so-called "anti-friction" bearings in railroad service. That means *bigger winter payloads at the lowest possible cost.*

Winter or any other time, properly maintained solid-type bearings are right for rolling stock. They make possible the very lowest interchange per diem rates for car rental. You can take the biggest load and make the fastest schedule. You save up to 1500 pounds dead weight per car . . . and get the smoothest ride on any standard truck. For complete details be sure to get your free copy of "The Facts About AAR Solid Journal Bearings." Just write a post card or letter to Magnus Metal Corporation, 111 Broadway, New York 6; or 80 E. Jackson Blvd., Chicago 4.

With this highly special laboratory equipment developed for the AAR Mechanical Division, journal resistance can be separated from all other elements of resistance in train operation

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Solid Bearings

Right for Railroads
. . . in performance . . . in cost

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